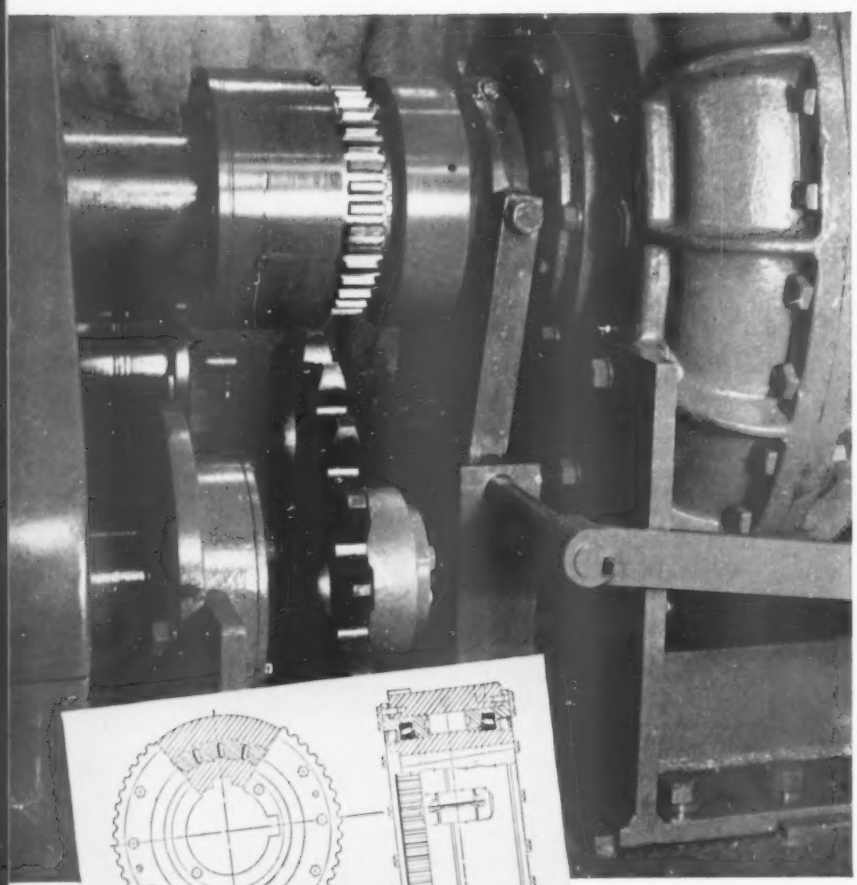
the OIL AND GAS JOURNAL

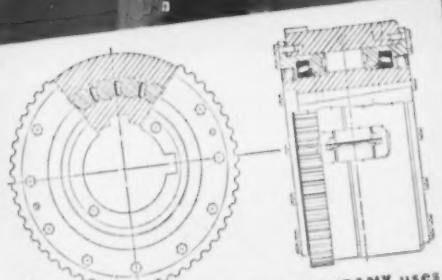
Automatic protection from impact loading on drilling rigs...*with help of TIMKEN® bearings*



THE Ideal Over-Running Clutch, adaptable to most drilling rigs, protects the braking operation from impact loads. It goes into action the instant that the drilling string is lowered. The Over-Running Clutch automatically locks the driving shafts so that hundreds of tons of drill pipe are lowered with perfect safety. Shock load is eliminated from hydromatic brake, drum shaft and connecting elements. No need for disengaging the coupling for a fast empty block pick-up and re-engaging the brake for the loaded block.

To maintain the precise alignment necessary for clutch to work properly, the National Supply Company selected Timken® tapered roller bearings. Their tapered construction lets them take radial and thrust loads in any combination. Line contact between rollers and races gives Timken bearings the extra capacity to handle the heaviest loads with ease.

With Timken bearings, friction is practically eliminated. That's because of their true rolling motion and smooth surface finish. Your machinery will give you longer, more dependable service with Timken bearings. Be sure to specify them in the oil field equipment you build or buy. Look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".



How **THE NATIONAL SUPPLY COMPANY** uses Timken tapered roller bearings in their Ideal Type A Over-Running Clutch to safely speed up "round trips" by elimination of "drag."

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⓡ AND THRUST →ⓣ← LOADS OR ANY COMBINATION →ⓡⓣ←

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 **OCTOBER 12, 1953**

RESEARCH

Life Preserver for Tideland Production

Pioneer tool pushers were transplanted sailors, taking land jobs in the first Pennsylvania oil fields. Right behind them came their heavy nautical equipment so easily adapted to drilling work. That's where we got our rigs, masts, logs, catheads, reels, etc. Offshore drilling now rounds out the cycle. And helping the industry get back its sea legs is Halliburton's energetic Marine Research. Since 1947, when the first cementing boat tied up to a Louisiana dock, Halliburton has devoted much effort to developing marine production improvement techniques. Today there are 14 vessels flying Halliburton's flag in the coastal canals, inland waterways, wherever wells are drilled. Such research is a life preserver for tideland production, helps recover this needed oil at lower costs.

PERPETUAL PROGRESS IN PRODUCTION IMPROVEMENT TECHNIQUES

HALLIBURTON OIL WELL CEMENTING COMPANY

DUNCAN, OKLAHOMA

the OIL AND GAS JOURNAL

OCTOBER 12, 1953 VOL. 52 NO. 23

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In Brief . . .

1. NEW PROCESS . . . Sinclair Research Laboratories, Inc., have developed a new catalytic reforming process which is highly efficient, yet quite flexible. The new platinum reforming catalyst has these advantages: (1) a high ratio of paraffin cyclization activity to hydrocracking activity; and (2) an ability to be regenerated with diluted air. Flexibility of the process is such that operation may be conducted with or without regeneration during processing.

2. DRILLING MAINTENANCE . . . No one phase of preventive maintenance can alone prevent premature failure in drilling rig compounding equipment. Rather, lubrication, proper alignment, and all the other factors must be taken together to insure continuous service. Most important of these items is correct alignment, since the most frequent source of trouble is misalignment between engine and compound shaft. Flexible couplings and bearings may then fail.

3. MULTIPURPOSE TERMINAL . . . Unusual in-line arrangement of facilities is featured at Standard Oil Co.'s (Indiana) Sugar Creek terminal and pump station. The entire pipe-line installation is located on a man-made shelf. Major structures are supported on piling because of the poor bearing qualities of the soil. Station receiving manifold is designed to receive three different products simultaneously from either the Sugar Creek or Neodesha refinery.

4. PETROCHEM EXPANSION . . . British petrochemical plants are being rapidly expanded to take care of mounting demands for polythene, styrene, ethylene glycol, and a substantial range of products based on ethylene oxide and glycol. The extraction of butadiene is planned at Wilton Works and at Grangemouth. Shell at Stanlow should be producing xylene and toulene in commercial quantities before year's end.

5. AUTOMATIC TRAP FARM . . . Completely automatic testing of individual wells is being accomplished by Shell Oil Co. at three trap farms in Brea-Olinda field near Los Angeles. At each installation wells are automatically diverted from a bulk manifold to test traps, where the oil and gas output is separated, metered, and recorded. Frequency and sequence in which wells are switched are preset on well switches.

Today's most dependable price tag

Maybe there was a day you could take quality for granted in buying plant equipment. But you weren't faced with today's fast-multiplying, high maintenance costs that can quickly cancel out first cost values.

Today's opportunity for thrifty buying is not in the price, but in greater assurance of quality. In piping equipment, for example, it's the ultimate cost that determines real value . . . not what you pay for it.

That's why thrifty buyers prefer Crane—the traditionally better quality piping materials. With each Crane valve or fitting installed, there's greater assurance of longer life, dependability, freedom from repairs . . . and Crane puts such quality into piping equipment for every industry.

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How does tetraethyl lead reduce *Pre-Ignition*?

• Research at the DU PONT PETROLEUM LABORATORY designed to help refiners solve pre-ignition problems through the use of additives

At present, pre-ignition during road operation threatens to limit further improvement in the efficiency of fuel utilization in passenger-car engines.

However, on the basis of extensive pre-ignition research, the Du Pont Petroleum Laboratory believes this problem may be solved in one or more ways.

The solution to the problem has been sought by:

1. Reducing the tendencies of combustion chamber deposits to glow and cause surface ignition of the charge.
2. Improving the ability of fuels to withstand ignition by such hot surfaces.

CERTAIN ADDITIVES reduce deposit glow and offer a solution to the problem. However, as engine compression ratios are increased still further it may also be necessary to increase the pre-ignition resistance of the fuels themselves.

EFFECTIVENESS OF TETRAETHYL LEAD AS AN ANTI-PRE-IGNITION AGENT

Some hydrocarbons are more sensitive than others to ignition by glowing deposit particles. Preflame reactions tend to sensitize the fuels to ignition. The effect of these preflame reactions can usually be minimized by tetraethyl lead, thus increasing the pre-ignition resistance of the gasoline.

CONTINUING STUDIES

This research on pre-ignition is part of a continuing program by the Du Pont Petroleum Laboratory. More complete details on these investigations can be obtained from any Du Pont Petroleum Chemicals Division district office listed below. Ask for papers entitled "Pre-Ignition in Automotive Engines" and "An Investigation of Pre-Ignition in Engines."

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NOW ... Long-Stroke, Hydraulic Pumping Units

Operate with WATER at LOW PRESSURE

in the "OILWELL" No. 2337 Unit

WHY . . . you may ask is the use of ordinary water so important in hydraulic pumping units?

For one thing, water is certainly CHEAPER than oil . . . should leaks occur in the system where several hundred gallons are involved.

In addition, water is far SAFER . . . as it is impossible for this fluid to ignite upon contact with engine exhausts or electric sparks and become a fire hazard.

The extremely low pressure system, utilized in "Oilwell" units, further minimizes leakage possibilities and permits the use of low-head centrifugal pumps. Impulse loads, which occur at critical points in the cycle when higher pressure or positive displacement pumps are used, are thus eliminated. This produces smoother reversals and cushions the loads on all underground as well as surface equipment.

When you have LIFTING Problems . . . **let your "Oilwell" Representative quote on the "Oilwell" Pumping Unit (Hydraulic or Mechanical) that will meet your requirements most effectively.**

BRIEF SPECIFICATIONS—No. 2337 UNIT

Maximum Polished Rod Load	37,000 lbs.
Stroke Length—Maximum	22' 9"
Minimum	14' 6"
Pumping Rate—Maximum	7 s.p.m.
Minimum	4 s.p.m.
Maximum Pressure in Hydraulic Cylinder	275 p.s.i.
Maximum Pressure in Tanks	250 p.s.i.

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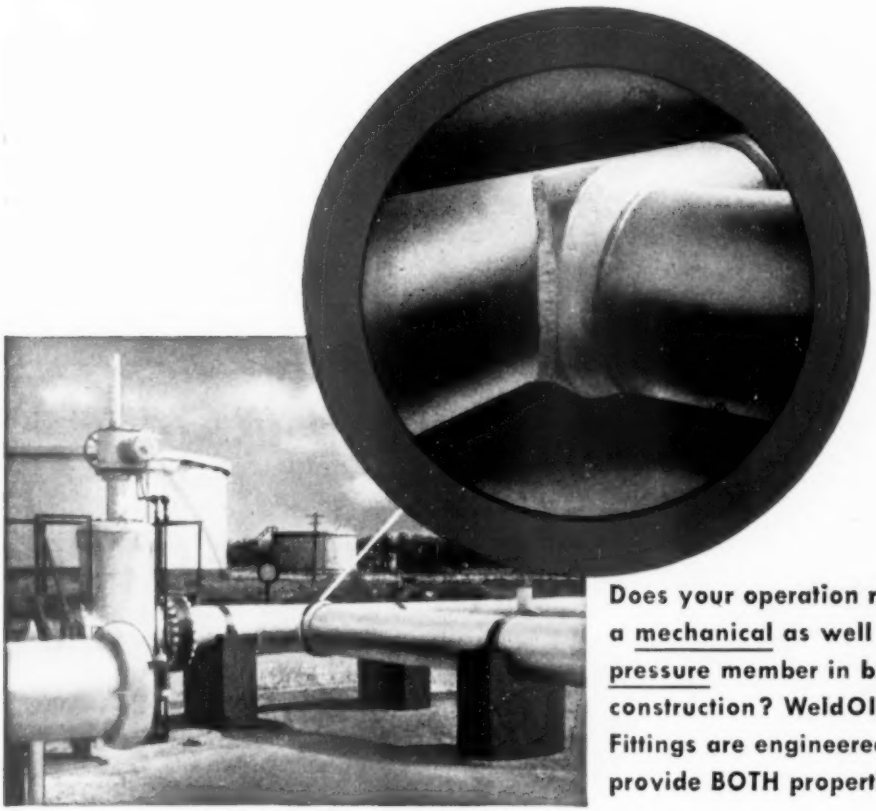
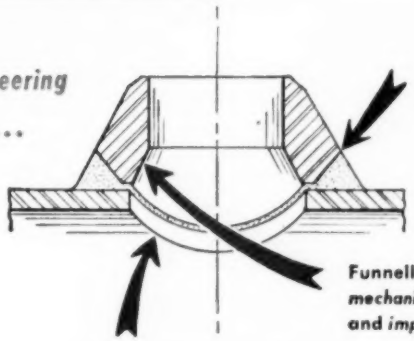


Does your operation require a mechanical as well as a pressure member in branch construction? WeldOlet Welding Fittings are engineered to provide BOTH properties.

A big portion of your engineering job is done for you, if you...

Specify Bonney WeldOlet Welding Fittings to Insure Permanent Strength



Reinforcement where both the mechanical and internal *stresses are most severe*

Funnelled to relieve *mechanical stress concentrations* and *improve fluid flow*

Shaped and beveled for *clean, quick* and *economical installation*

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WELDING FITTINGS DIVISION

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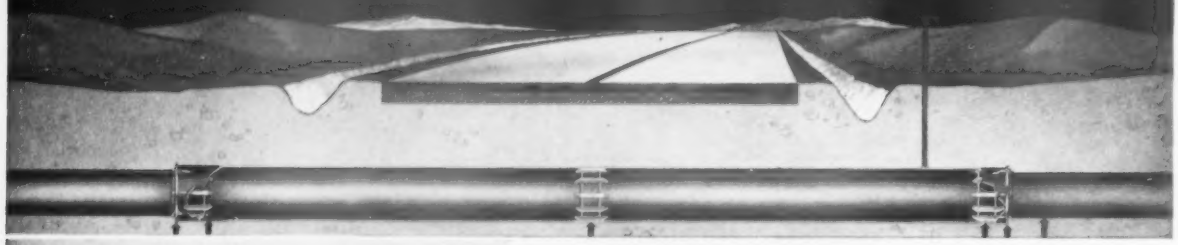


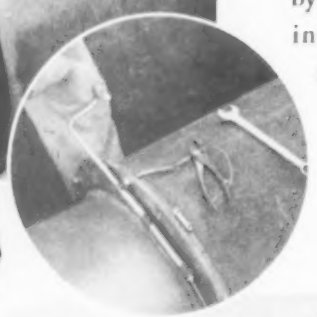
Williamson

CONCENTRIC-SUPPORT INSULATORS

Provide low-cost, dependable protection for right-of-way crossings . . . Simple to install with a common wrench . . . Impervious to pipe coatings . . . Support blocks center pipe in casing, spacer blocks provide clearance through casing . . Available for all combinations of pipe and casing diameters.

TYPE "L" WmSEAL CASING BUSHINGS

Provide a water-tight seal even under the worst conditions of out-of-round casing . . . Unaffected by dirt, moisture or backfill during or after installation (no dope, adhesive or shield required) . . . Electrical insulation of pipe from casing provides economical cathodic protection.



Easily installed with common hand tools.

Write for Bulletin 249-A

T. D. Williamson, Inc.

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CLEANS PIPE LINES

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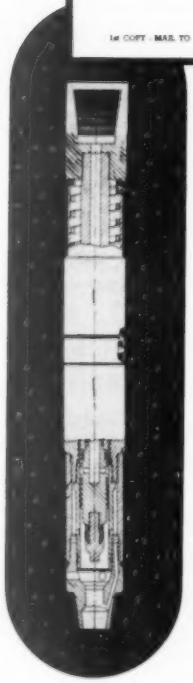
HALLIBURTON'S

Hydro-Spring TESTER

Halliburton
DUNCAN, OKLAHOMA
FORMATION TESTING AND TOOL SERVICE TICKET
Hot Springs, Wyoming
Rogan
John Doe Oil Company
Box 4180
Denver, Colorado
Good
Good
Hydro-Spring Tester
Testing for oil and gas. Tool open & tested in green 15 min. ran to surface in 17 min. SI to surface 1 hr. 13 minutes.
M. A. Sharp
Hot Springs, Wyoming
John L. Doe
Very
Yes
Ran Hydro-Spring Tester operated exceptionally well. Request it for all future tests.
No. 92980 AT
1st COPY - MAIL TO DUNCAN



Hydro-Spring Patent Applied For

Results with this revolutionary testing tool have exceeded the highest hopes of the industry.

Released for exploratory field testing in June, 1952, Hydro-Spring Tester gained rapid recognition. Since that time, it has established a perfect record – not one mis-run in more than 2000 tests – *under all conditions.*

Unusual features that enabled this Halliburton testing tool to establish its remarkable record include:

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- Provides positive indication at surface that tool is open.
- Permits reversing off bottom simultaneously with taking closed-in pressure.
- Can be rotated coming out of hole.
- Requires fewer assemblies.

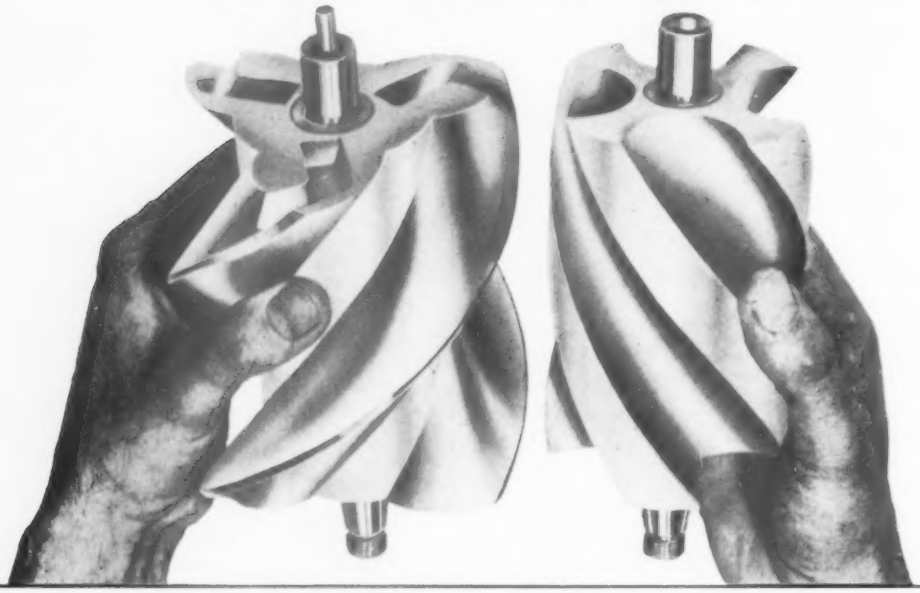
If you've waited for Hydro-Spring to prove itself – here's all the proof you need. So, take advantage of these successful features on your next test. Phone your nearby Halliburton Testing Operator. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

YEARS AHEAD IN DRILL STEM TESTING!

HALLIBURTON

No metal-to-metal contact

AVOIDS WEAR AND REPAIR



***Specify Brodie BiRotor**—the meter with the replaceable measuring unit.*

Write for Pipe-Line Metering Bulletin No. 634

OF BRODIE *BiRotor* MEASURING UNITS

- With just two moving parts in Brodie BiRotor measuring chamber—there's no metal to metal contact . . . no mechanical friction . . . no complicated mechanisms to wear or need repair.
- Smooth vibrationless performance with static and dynamic balance further insures long trouble-free service life.
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- Welded all-steel housing resists external and internal shocks or impacts—avoiding damage and leak hazards.

Brodie BiRotor Meters withstand long periods of steady and constant use with virtually no signs of wear. They're really built to take it. For maximum service and minimum trouble in petroleum metering—standardize on Brodie BiRotor—*the meter with the replaceable measuring unit.*

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We like that name. It tells the story of Republic's leadership in working for this dynamic industry. It tells, too, of the many ways our bank works for *you* — for every oilman!

Oil is America's fortune. It means better living — bigger business for every American. We're glad your bank has a hand in it.

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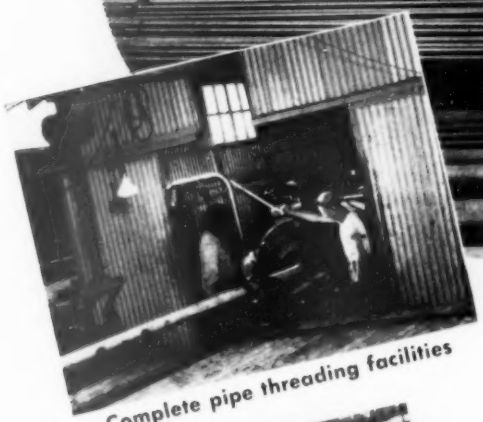
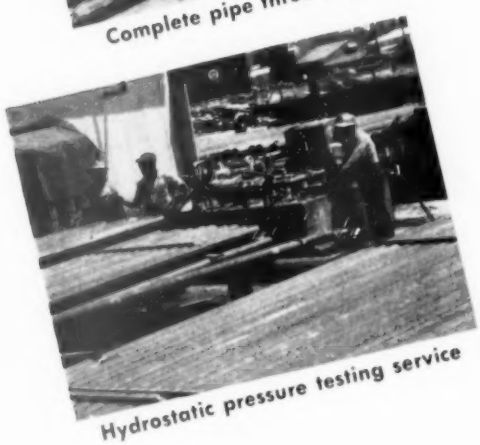


Complete pipe threading facilities



Hydrostatic pressure testing service

This new pipe runway and loading crane is a further step in Tex-Tube's progress in becoming a leading pipe supplier for the Southwest.

Tex-Tube carries a complete stock of pipe and tubing for all industries for fast, dependable delivery on all your pipe needs.

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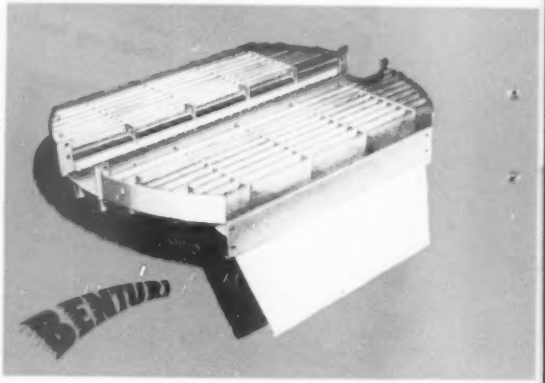
Is High Liquid Volume your problem?

The "Benturi" slot energy...directed toward the downcomer...provides a greater liquid handling capacity with lower pressure drop...than is possible to obtain with conventional bubble trays. Write or wire us your process condition, and we'll show you how your problems can be simplified with "Benturi" Kaskade trays, no obligations.



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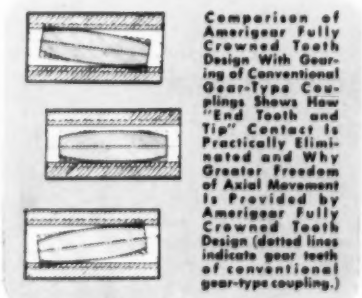
THE Amerigear* FULLY CROWNED TOOTH DESIGN

practically eliminates "End Tooth and Tip" contact
. . . gives greater freedom of axial movement

Crowned Tip Contacts Root of Internal Gear Tooth in Sleeve, Accurately Piloting Sleeve with a Ball and Socket Action.
Chamfered to Eliminate Interference with Sleeve Tooth Fillet and Allow Contact on True Flank of Gear Tooth.
Crowned Flank Carries All the Load and Provides for Correction of Lateral and Angular Misalignment Conditions.
A MAJOR IMPROVEMENT IN GEARING

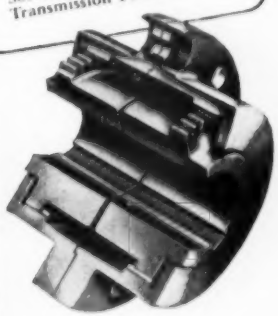
Pat. & Pat. Pending



Comparison of Amerigear Fully Crowned Tooth Design With Gearing of Conventional Gear-Type Couplings Shows How "End Tooth and Tip" Contact Is Practically Eliminated and Why Greater Freedom of Axial Movement Is Provided by Amerigear Fully Crowned Tooth Design (dotted lines indicate gear teeth of conventional gear-type coupling.)

Copyright 1953

Amerigear*
Fully Crowned Tooth Design Solves Wide Range of Power Transmission Problems.



Oil Seals of Amerigear Couplings Are As Advanced in Design, Performance, and Effectiveness As Is the Amerigear Fully Crowned Tooth.

This major improvement in gearing—a fundamental improvement in gear tooth design results in these advantages: (1) Relief from extraneous stresses; (2) Crowned flanks providing for angular and lateral misalignment with back lash reduced to a minimum; (3) Torque load carried on flanks of teeth rather than on tooth edges; (4) Greater loads and higher speeds with corresponding longer life for coupling and equipment; (5) Close fit on crowned tips and flanks of teeth, inducing a ball and socket action between hub teeth and internal sleeve teeth, assure quiet and smooth performance. These advantages distinguish the Amerigear Couplings from common gear-type couplings. If your problem arises from excessive offset or angular misalignment, tight back lash requirement, space limitations, high speeds and loads, or any combination of these, the best solution is assured by use of the Amerigear Couplings with the Fully Crowned Teeth. Amerigear Engineers are available for consultation.

*Trade Mark Reg.

AMERICAN FLEXIBLE COUPLING COMPANY

ERIE, PA., U. S. A. ***Originator of the Amerigear Fully Crowned Tooth***

Sales Offices in Principal Industrial Centers

In Canada: Canadian Zurn Engineering, Ltd. • 2052 St. Catherine St. W., Montreal 25, P. Q.

American Flexible Coupling Co., Erie, Pa., U. S. A.

Please send me further information regarding AMERIGEAR COUPLINGS with the Fully Crowned Teeth and Catalog No. 501.

Name ..... *Title*

Company .....

Address .....

City ..... *State*

Please attach to your business letterhead.

Graphic control . . . *for leading industries*

The well-established trend to centralized graphic instrumentation has brought with it many specific advantages to the operation of complex, modern processing units. And to realize most fully the potential advantages of improved efficiency, simpler supervision and better coordination, many leading companies have turned to Honeywell graphic control.

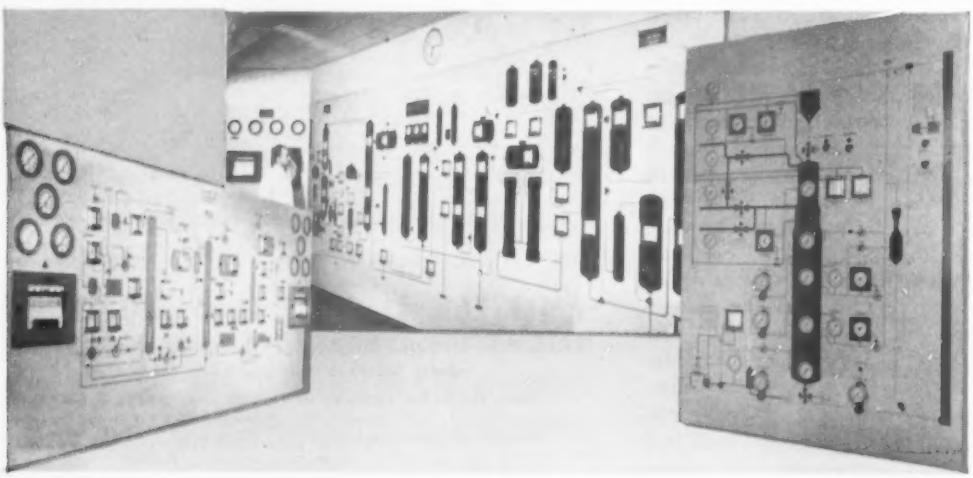
Among the engineering, construction and producing organizations which use Honeywell panels are some of the best-known names in their fields. The ever growing list includes:

C. F. Braun
Catalytic Construction Co.
The Fluor Corporation Ltd
Foster Wheeler Corp.
Gulf Oil Corporation
Imperial Oil of Canada
M. W. Kellogg
The Lummus Co.
Pan-Am, Southern
Phillips Petroleum Co.
The Refinery Engineering Co.
Shell Oil Co.
Sinclair Refining Co.
Socony-Vacuum Oil Co.
Standard Oil Co. of California
Standard Oil Co. of Indiana
Standard Oil Co. of New Jersey
The Texas Company
Tide Water Associated Oil Company
Union Oil Co. of California

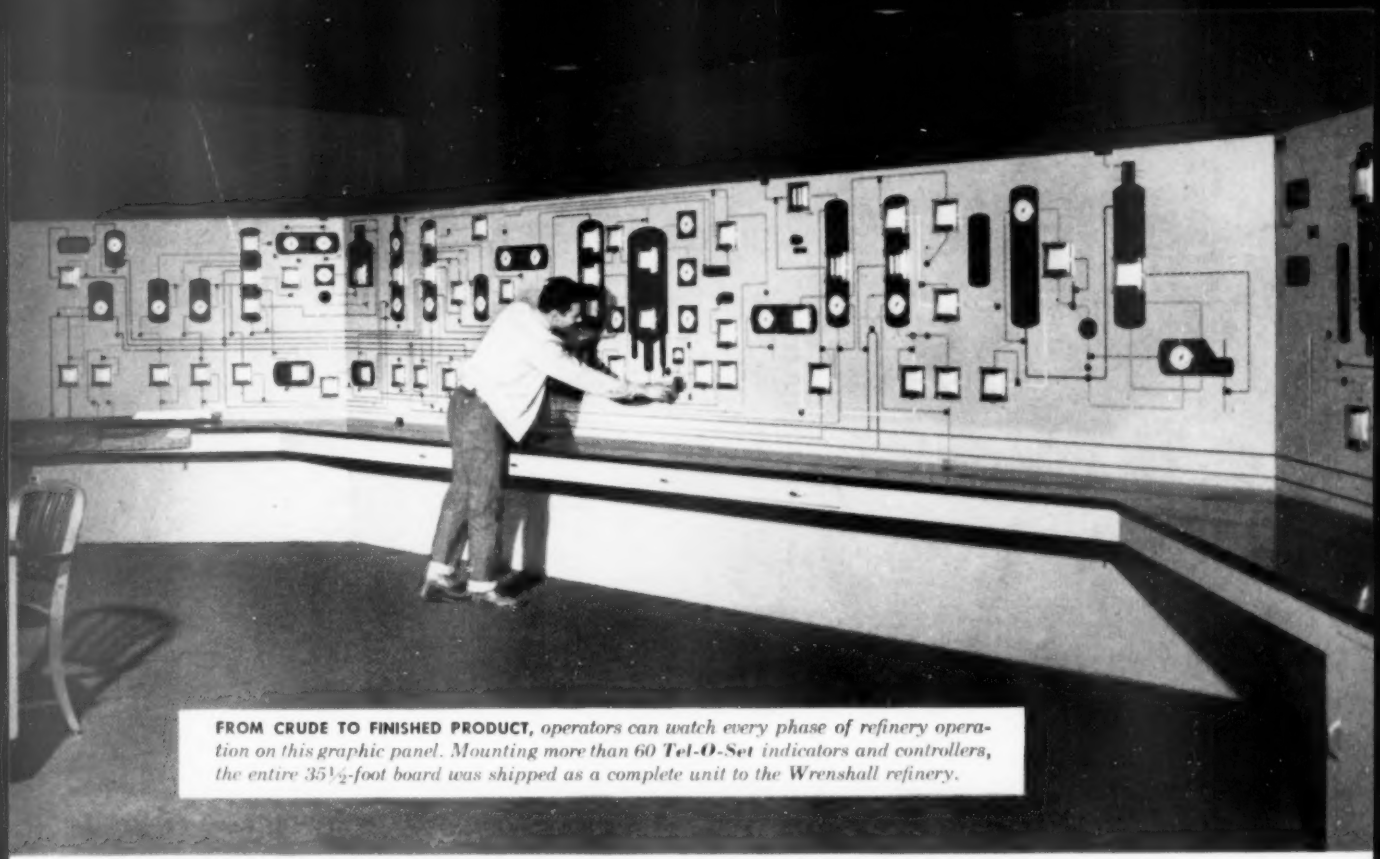
Reasons for acceptance

Behind this industry-wide acceptance stand several definite reasons. First is system engineering . . . by graphic panel specialists who translate process requirements into an integrated, harmonious design. Second is instrumentation . . . including a full line of *Tel-O-Set* miniature indicators, recorders and controllers, and *ElectroniK* instruments for supplementary recording, which enable Honeywell to satisfy the requirements of every phase of process control. And third is workmanship . . . skilled assembly either in a manufacturing department devoted exclusively to this work, or, if desired, at the job site by our own experienced branch installation crews—an organization built up over 15 years for the installation of industrial and commercial control systems.

Graphic control *centralized*



FUNCTIONAL DESIGN *for maximum efficiency is the keynote of Honeywell graphic instrumentation. These typical panels show a few of the varied types which have been built for varied process applications.*



FROM CRUDE TO FINISHED PRODUCT, *operators can watch every phase of refinery operation on this graphic panel. Mounting more than 60* ***Tel-O-Set*** *indicators and controllers, the entire 35½-foot board was shipped as a complete unit to the Wrenshall refinery.*

for complete refinery *on a single Honeywell panel*

THE MOST up-to-date concepts of petroleum processing were embodied in International Refineries' new plant at Wrenshall, Minnesota. Designed and built by the Lummus Company, this refinery produces straight run, cracked and polymer gasolines, diesel and other fuel oils, all of which are distributed by Western Oil & Fuel Co.

An outstanding feature of this new refinery is its continuous flow operation . . . no intermediate storage tanks are needed between processing stages. This "straight through" design naturally calls for precise, closely integrated control of related processes. To meet these exacting control requirements, refinery and design officials selected Honeywell graphic control.

The big graphic panel shown above combines all the instrumentation for eight different refining processes. Operators can follow the entire functioning of the plant from crude to finished products, from this single control center. Worked out in detail by Honeywell design specialists, this panel does the job that would ordinarily require four or more separate panels. Not only were substantial savings effected in space, but the panel affords complete centralization of plant control . . . flexibility to meet seasonal variations in product demand . . . and maximum efficiency of process supervision, both for operators and for management personnel.

Your nearby Honeywell sales engineer will welcome the opportunity to discuss your graphic control requirements. Call him today . . . he is as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4488 Wayne Ave., Philadelphia 44, Penna.

● **REFERENCE DATA:** Write for Bulletin 85-20, "Centralized Instrumentation . . . unlimited."

MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

First in Controls

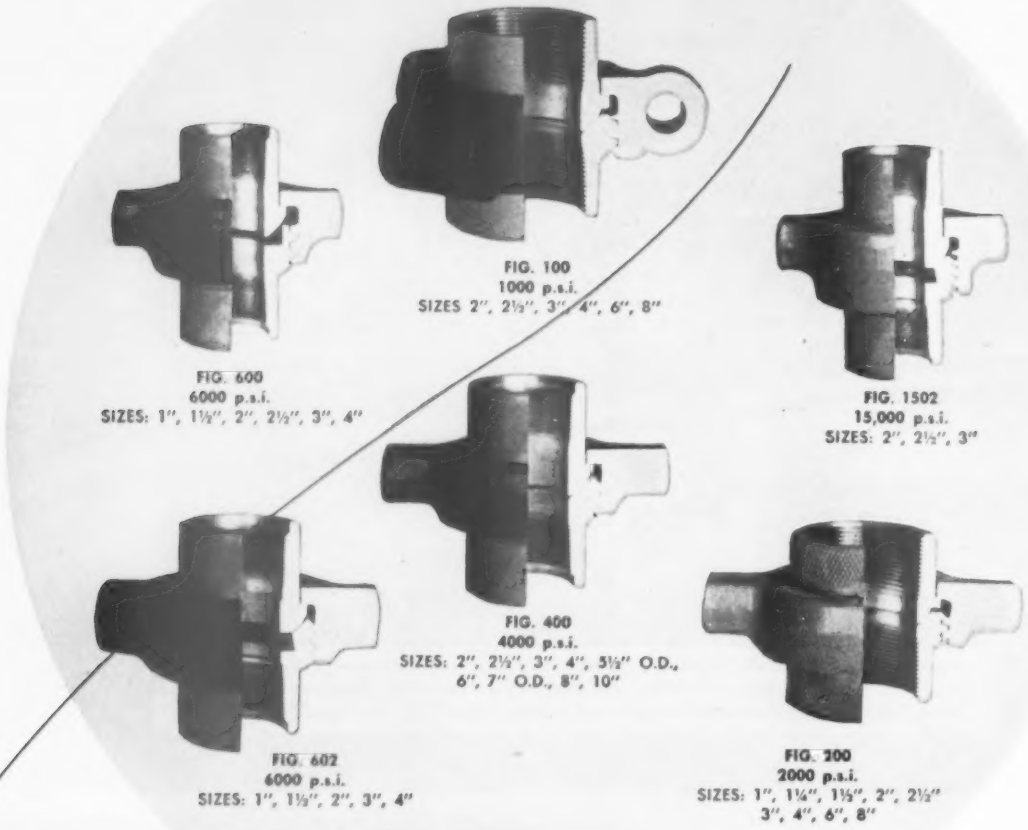


FIG. 100
1000 p.s.i.
SIZES 2", 2½", 3", 4", 6", 8"

FIG. 600
6000 p.s.i.
SIZES: 1", 1½", 2", 2½", 3", 4"

FIG. 1502
15,000 p.s.i.
SIZES: 2", 2½", 3"

FIG. 400
4000 p.s.i.
SIZES: 2", 2½", 3", 4", 5½" O.D., 6", 7" O.D., 8", 10"

FIG. 602
6000 p.s.i.
SIZES: 1", 1½", 2", 3", 4"

FIG. 200
2000 p.s.i.
SIZES: 1", 1¼", 1½", 2", 2½" 3", 4", 6", 8"

THERE'S ONE FOR EVERY SERVICE

. . . AND THEY'RE AVAILABLE EVERYWHERE!

It's no wonder WECO Unions are the most popular and widely used by the oil industry. The wide range of types, pressures (1,000 - 15,000 lb.) and sizes (1" through 10") means you can get the right WECO Union wherever they're needed on your drilling rig — your production hook-ups — tank and separator manifolds — field gathering lines, and every other service in the oil field. There are WECO Unions for pump suction line connections, a blanking union for scraper box and jumper assembly service, manifolding, terminal installations and transfer lines.

Every union has the six basic factors of design and manufacture which make "WECO — the Unions you can trust for sealing and service" — SELECTED RAW MATERIALS — ADVANCED MANUFACTURING PRACTICES — BALL AND CONE SEAT — RUGGED ACME THREADS — HEAVIER WALL SECTIONS — PRECISION SEATING SURFACES.

And what's more, you can get your WECO Unions from supply stores everywhere — that's why "It's Wise to Standardize with WECO."

WECO
REGISTERED TRADE MARK
UNIONS

It's Wise to Standardize with . . . WECO . . .

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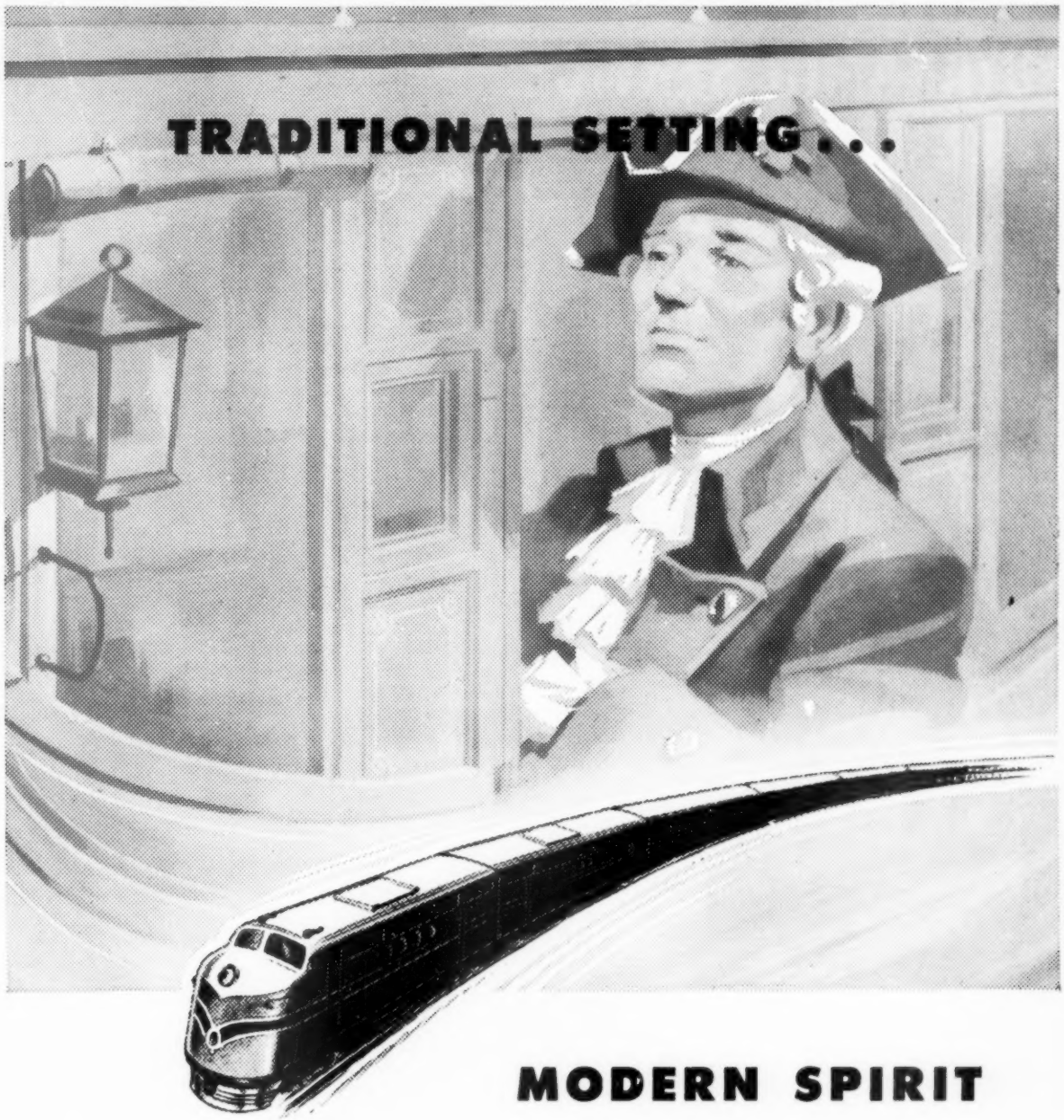
Division of Chiksan Company
HOUSTON 1, TEXAS
CHIKSAN COMPANY
Brea, Calif. Chicago 28, Ill. Newark 2, N. J.
CHIKSAN EXPORT COMPANY, Brea, Calif. Newark 2, N. J.

Manufacturers and Distributors of Oilfield, Refining, Marine and Industrial Equipment

PESA

MOST COMPLETE LINE OF WING UNIONS IN THE WORLD



For 169 years The Bank of New York, founded in 1784 by business men *for* business men, has moved steadily ahead with the commercial growth of the nation. Over the years The Bank has developed completely modern facilities through up-to-date application of time-tested knowledge. Today its Commercial Department continues to respond fully to the needs of business. The Bank has customers in each of the 48 states, engaged in hundreds of different branches of commerce and industry—and finances foreign trade throughout the world. The services of our Commercial Department, as well as those of our Trust and Investment Research Departments, are at your disposal, wherever you are, whatever the nature of your business.

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Main Office: 48 WALL ST. ☆ *Uptown Offices:* 530 FIFTH AVE. ☆ MADISON AVE. AT 63rd ☆ MADISON AVE. AT 73rd

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CYANAMID SERVICE:

source of progress throughout the petroleum industry

Cyanamid's Refinery Chemicals Department is staffed by specialists in every phase of petroleum production and refining. These specialists are backed up by extensive manufacturing facilities and continuing, industry-wide research.

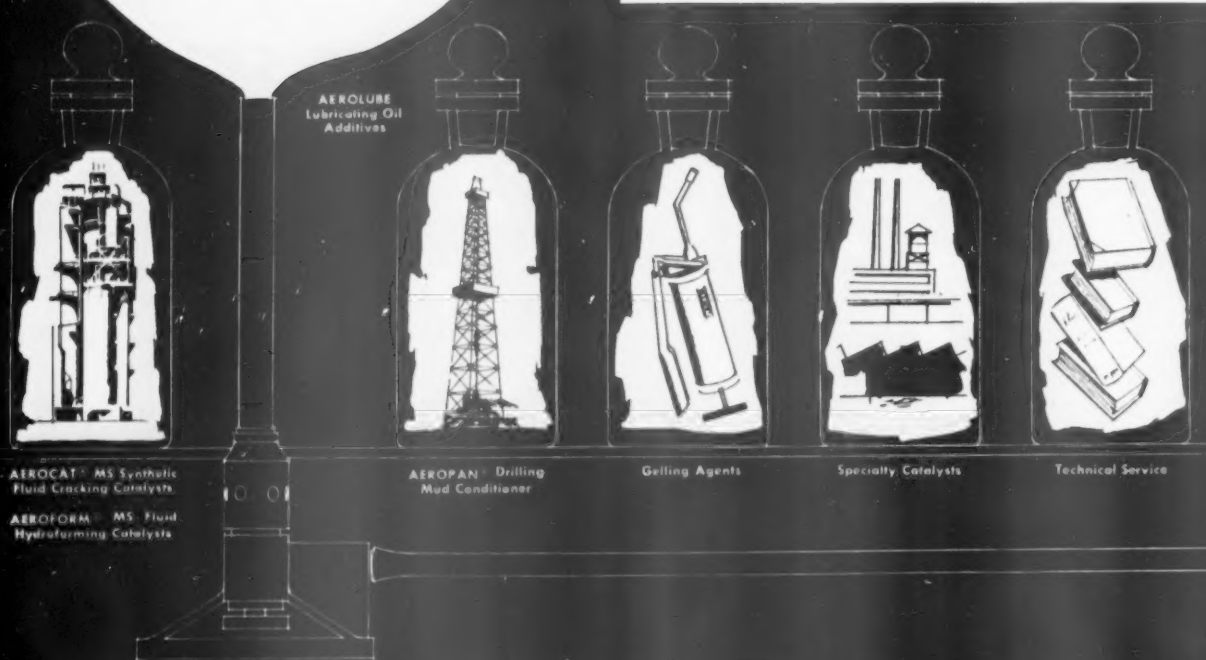
Thus the Refinery Chemicals Department—through Cyanamid Chemicals—is uniquely equipped to serve every phase of the petroleum industry.

For example: Over the years, AEROLUBE® lubricating oil additives have been developed as the answers to specific lubricating performance problems. Cyanamid's most recent contribution, AEROLUBE 106, is designed specifically for passenger car motor oils. AEROLUBE 106 provides maximum engine cleanliness under stop-and-go driving conditions so common to present-day automotive operation. In addition, oils treated with AEROLUBE 106 protect bearings against corrosion and deposits encountered in high speed, high temperature over-the-road operation. AEROLUBE 106 has inherent pour-depressant and water-resistant qualities not found in most detergent-type additives.

AMERICAN *Cyanamid* COMPANY

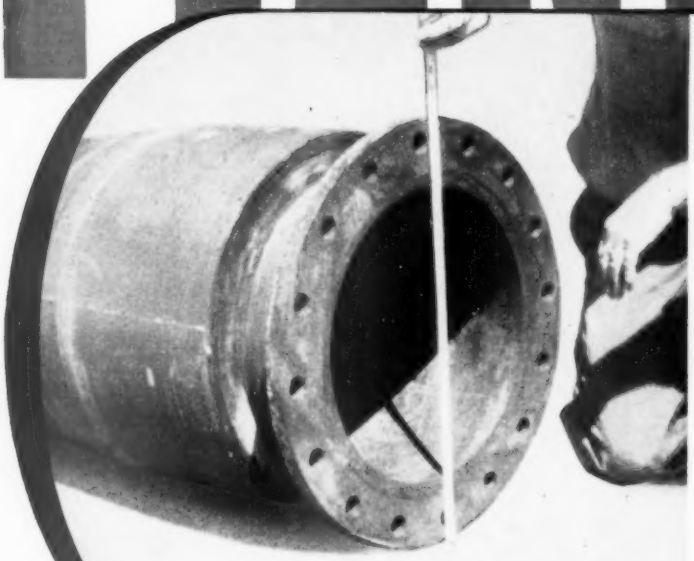
REFINERY CHEMICALS DEPARTMENT, DIV. OG-10
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

In Canada: North American Cyanamid Limited, Toronto and Montreal



Industrial rubber products especially built for LONG SERVICE

PIONEER



Pioneer builds hose to fit the job

Handling sea shells is rugged duty for a hose. The hard, sharp edges of the shells would soon cut through an ordinary hose. However, this Pioneer hose, which is a key part of an operation which sucks shells from the bottom of inland bays for use in the manufacture of cement, *stays on the job day after day, month after month.*

The secret is that *this* hose was specially designed at Pioneer laboratories for *this* particular type of service. The hose tube alone is an inch thick and outside that are 11 plies of reinforcement plus the cover. The right hose for the job, proved through long service.

Every type of hose service demands special characteristics. That's why Pioneer Rubber Mills manufactures 70-odd *standard* types of industrial rubber hose, and frequently designs special hoses, such as the one above, for special applications.

So, whatever your industrial rubber hose needs, why not put the unusual capabilities of this organization to work for you? Your nearest Pioneer representative will be glad to tell you the full story on Pioneer hose as well as belting, packing, and other products especially designed for long life.

PIONEER RUBBER MILLS

Pioneering in rubber since 1888

BRANCHES: CHICAGO • DALLAS • LOS ANGELES
MILWAUKEE • ST. LOUIS • SAN FRANCISCO

DISTRIBUTORS in other principal cities

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FACTORIES located at Pittsburg, Calif.

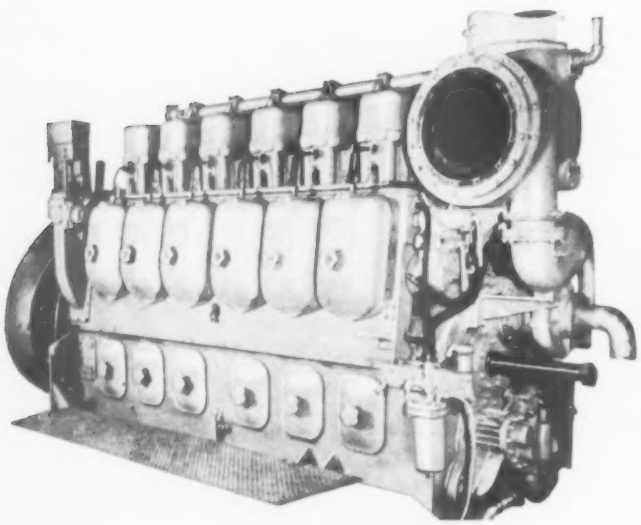
MAIN OFFICE: PIONEER BUILDING • 353 Sacramento Street, San Francisco 11

Presenting...

the heavy-duty, lightweight

ALCO 251-A

all-purpose diesel engine



ALCO 251-A
SPECIFICATIONS

Size: 6-cylinder
Bore: 9"
Stroke: 10½"
Cycles: 4 turbocharged
Horsepower: 690
Rpm: 900
Net weight (engine only):
21,350 lb dry;
22,500 lb wet

TYPICAL
APPLICATIONS

Oil-well drilling rigs
Crude oil pipeline pumping
Products pipeline pumping
Gas pipeline pumping
Electric power generation
Irrigation pumping
Dredging
Portable units mounted on skids, trailers, rail cars

The Alco Model 251-A—an in-line, 9 x 10½-in. diesel engine designed for a variety of stationary or portable uses in continuous or standby service—incorporates Alco engineering and experience gained in the manufacture of the famed "244" V-12 and V-16 engines of the same bore and stroke. The 251-A combines heavy-duty output with light weight, ease of maintenance, and low operating costs.

Special Features Include:

★ Engine base and frame of structural steel—lighter weight permits lighter, more economical foundations.

★ Compact design (11 ft 5 in. long, 4 ft 11 in. wide)—saves floor space.

★ All wearing parts easily accessible.

★ Lube oil sump, pump, cooler and strainers, and circulating water pump, are integral parts of engine—for low installation cost.

★ Arranged for Dual Fuel by *adding* parts—not by replacing parts or rebuilding engine.

★ Started by air motor, on as little as 60 lb air.

★ Free end has extension driveshaft for auxiliaries (radiator fan, air compressor, etc.).

Additional details are given in Bulletin DE-2, which your nearest Alco sales representative will be happy to send you, along with complete information in terms of your own specific requirements. Contact him at New York, Beaumont, Chicago, Cleveland, Houston, Kansas City, San Francisco, Schenectady or St. Louis.

Alco THE MARK OF MODERN ENGINEERING

ALCO DIESELS

AMERICAN LOCOMOTIVE COMPANY
SCHENECTADY, N. Y.

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to be a supplier

to the world's

most progressive

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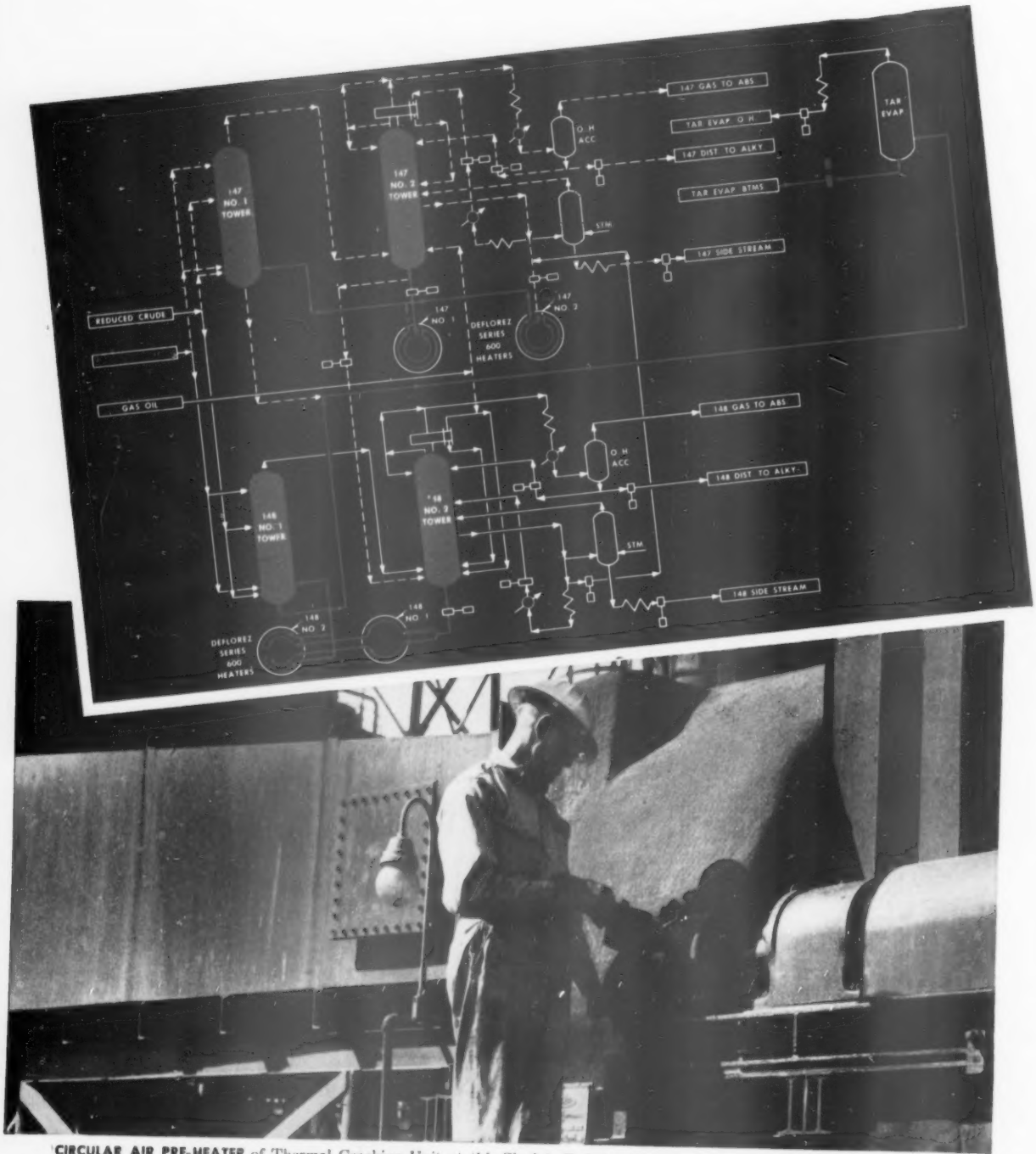
OIL PROGRESS WEEK OCT. 11-17

How SINCLAIR REFINING COMPANY



CIRCULAR AIR PRE-HEATER of Thermal Cracking Unit at this Sinclair Refining Company operation has elements of 11-12% chromium Stainless with U·S·S 18-8 used in certain high temperature areas.

uses *Stainless Steel*

in this Thermal Cracking Unit at Houston Refinery

Operating on a 100% high sulphur charging stock and processing 4500 barrels of gasoline daily, this Thermal Cracking Unit at Sinclair Refining Company's Houston Refinery, Houston, Tex., depends heavily on Stainless Steel to keep production flowing and downtime at a minimum.

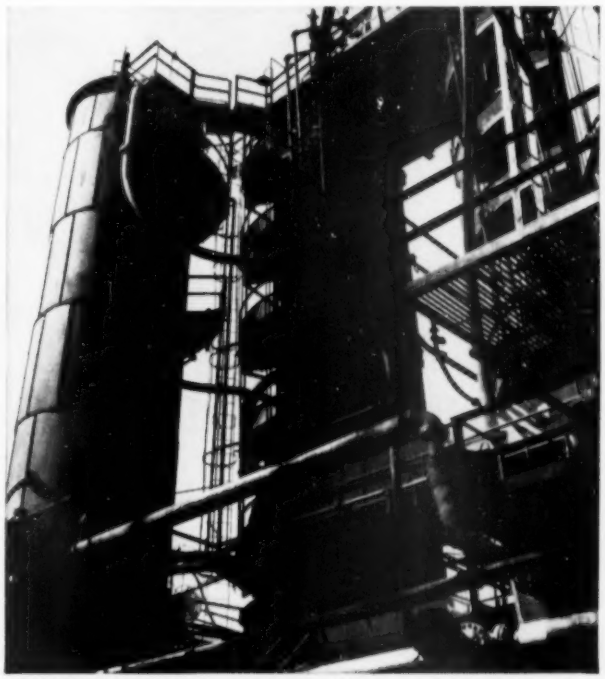
The flow diagram shown here indicates the extensive use of Stainless. Red lines on the diagram indicate where it is used.

Heater tubes in the furnaces are Stainless Steel —4-6% chromium in areas where temperature does not exceed 850°F.; 7-9% chromium in areas where it does exceed 850°F. The circular air preheater has 11-13% chromium elements with U·S·S 18-8 Stainless in areas where flue gas enters at 1300°F. and leaves at 550°F.

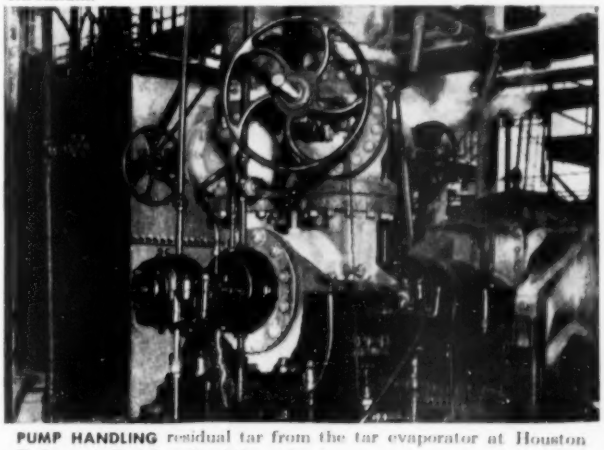
The fractionating towers are lined with 11-13% chromium Stainless Steel and internals, including bubble caps and trays, are 7-9% chromium. Transfer lines between furnaces and fractionating towers, operating under 600 psi pressure at 965°F. are 7-9% chromium Stainless Steel.

Made entirely from Stainless Steel is a pump that handles residual tar from tar evaporator units.

There are many locations in your plant where the proper grade of Stainless Steel can help you maintain uninterrupted production. Our metallurgical and research personnel will be glad to assist you with recommendations. There is no obligation, of course.



FRACTIONATING TOWER in the Thermal Cracking Unit is lined with 11-13% chromium Stainless Steel; bubble caps and trays are 7-9% chromium.



PUMP HANDLING residual tar from the tar evaporator at Houston Refinery is Stainless Steel throughout.

UNITED STATES STEEL CORPORATION, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S STAINLESS STEEL

USS

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

3-419

UNITED STATES STEEL

A COMPLETE PACKAGE OF STURDYBILT prefabricated houses with ONE purchase order....

PLANS . . .

FACTORY FABRICATION

TRANSPORTATION TO SITE . . .

ERECTION

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When you buy STURDYBILT Housing you have no worry about plans, construction, design or erection. One purchase order from you sets in motion the prefabricating, transportation and erection of practically any type of buildings you need. All you do is tell us what buildings you need and where they are to be located. We are your architect, contractor and builder. This is the fast, efficient and economical way to get the modern housing you need.

MANUFACTURERS OF SPECIAL MILLWORK: DISTRIBUTORS OF CURTIS WOODWORK AND JOHNS-MANVILLE BUILDING MATERIALS

WRITE FOR INFORMATION

STURDYBILT PREFABRICATED, DEMOUNTABLE HOUSES

SOUTHERN MILL & MANUFACTURING CO. • TULSA, OKLAHOMA

phmi

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

View, showing 16 cells of new Foster Wheeler cooling tower erected on foundation of old tower. Portion of old tower, shown at right, was replaced by 8 cells of new tower.

Tailored to fit customer plant conditions!

THE ERECTION of this new 24-cell cooling tower on the same foundation as the 56-cell tower which required replacement, without interruption in cooling capacity, is another example of the ability of Foster Wheeler to tailor the job to conditions in the customer's plant.

To assure a continuous supply of cooling water while the new tower was being built, 30 cells of the old tower were razed and the remaining 26 cells connected to two smaller existing towers by a temporary flume. The first 16 cells of the new tower were then erected and put into operation in time to meet the oncoming summer heat load. The remainder of the old tower was then removed and the balance of eight new cells erected.

It is through such unusual types of installations that Foster Wheeler has gained the reputation for engineering and construction excellence.

FEATURES OF THIS INSTALLATION:

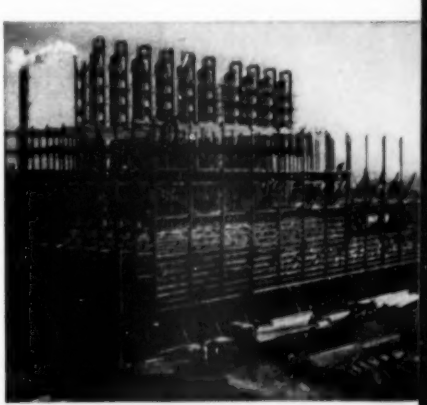
Combination cast iron and red brass distribution system, with 720 special full coverage red brass up-spray nozzles, provides uniform water distribution over a wide variation in water flow rates. Induced-draft fans with 16-foot stacks discharge tower vapors at a high velocity 60 ft. above basin curb—reducing recirculation to a minimum.

The new tower requires 4320 sq. ft. less ground area than the old tower—enough to allow for the addition of four 30 ft. by 36 ft. cells for future requirements.

* * *

DESIGN CONDITIONS

Capacity	48,000 U.S. gpm
Inlet water temperature	120° F
Outlet water temperature	85° F
Wet bulb temperature	80° F

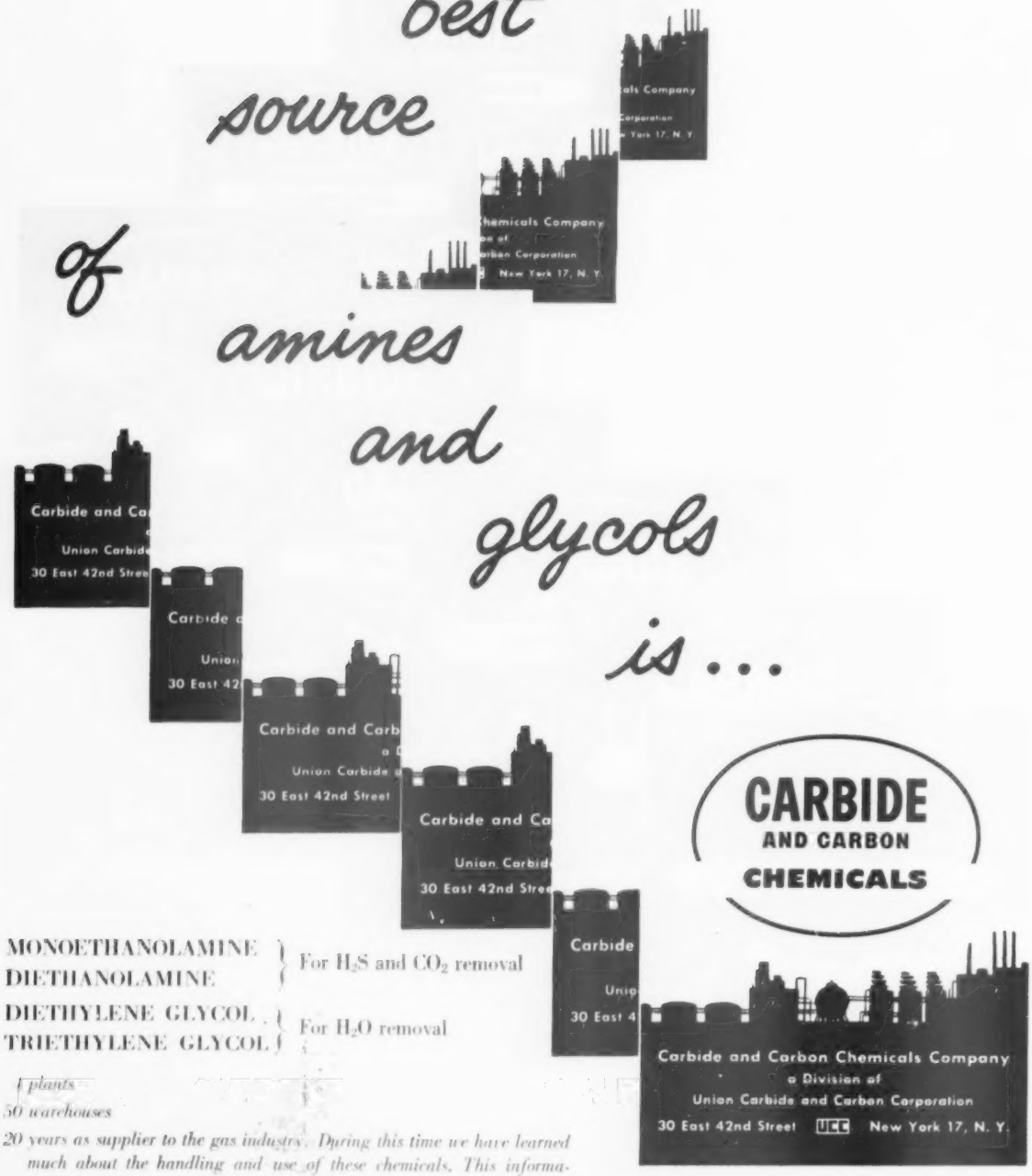


FOSTER WHEELER CORPORATION, 165 BROADWAY, NEW YORK 6, NEW YORK

FOSTER WHEELER

IT BEARS REPEATING . . .

your best source of amines and glycols is . . .



CARBIDE AND CARBON CHEMICALS

MONOETHANOLAMINE DIETHANOLAMINE	For H_2S and CO_2 removal
DIETHYLENE GLYCOL TRIETHYLENE GLYCOL	For H_2O removal

4 plants
50 warehouses

20 years as supplier to the gas industry. During this time we have learned much about the handling and use of these chemicals. This information is yours, without obligation, by writing to our nearest office.

Carbide and Carbon Chemicals Company
a Division of
Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

Yours

For the Asking—

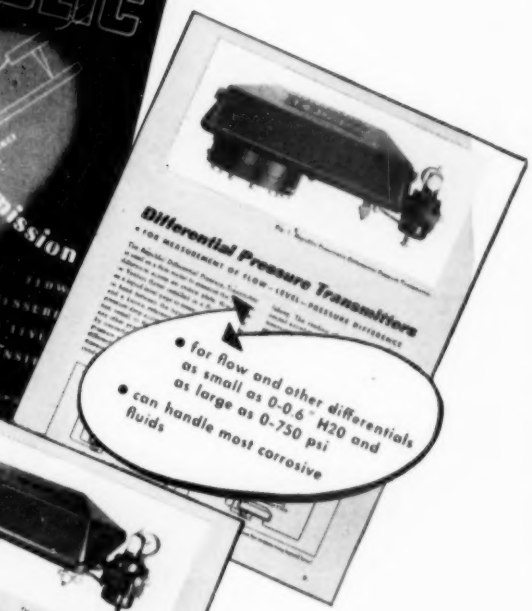
New DATA BOOK

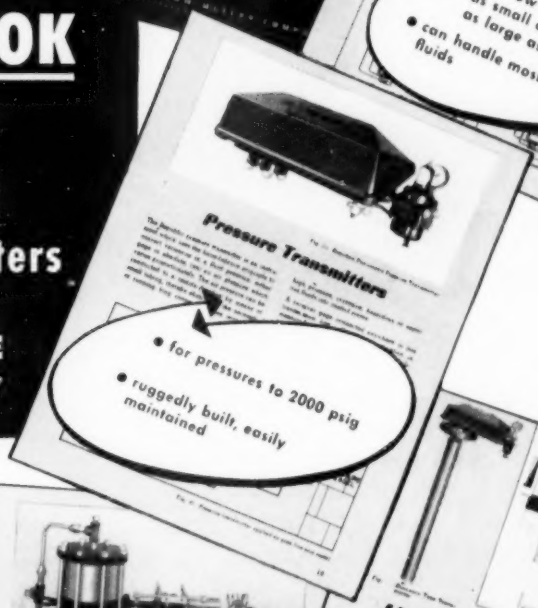
about ALL REPUBLIC Pneumatic Transmitters

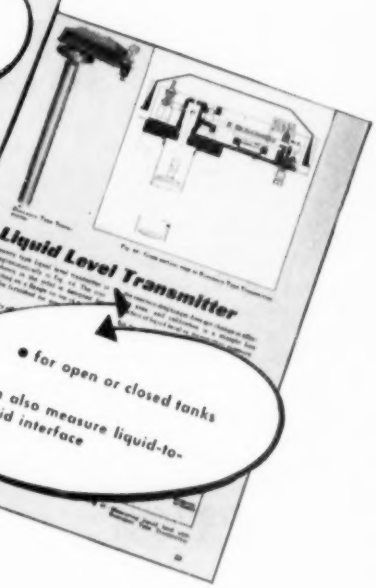
for Measuring

FLOW • PRESSURE

LEVEL • DENSITY


Differential Pressure Transmitters
• for flow and other differentials as small as 0-0.6" H20 and as large as 0-750 psi
• can handle most corrosive fluids





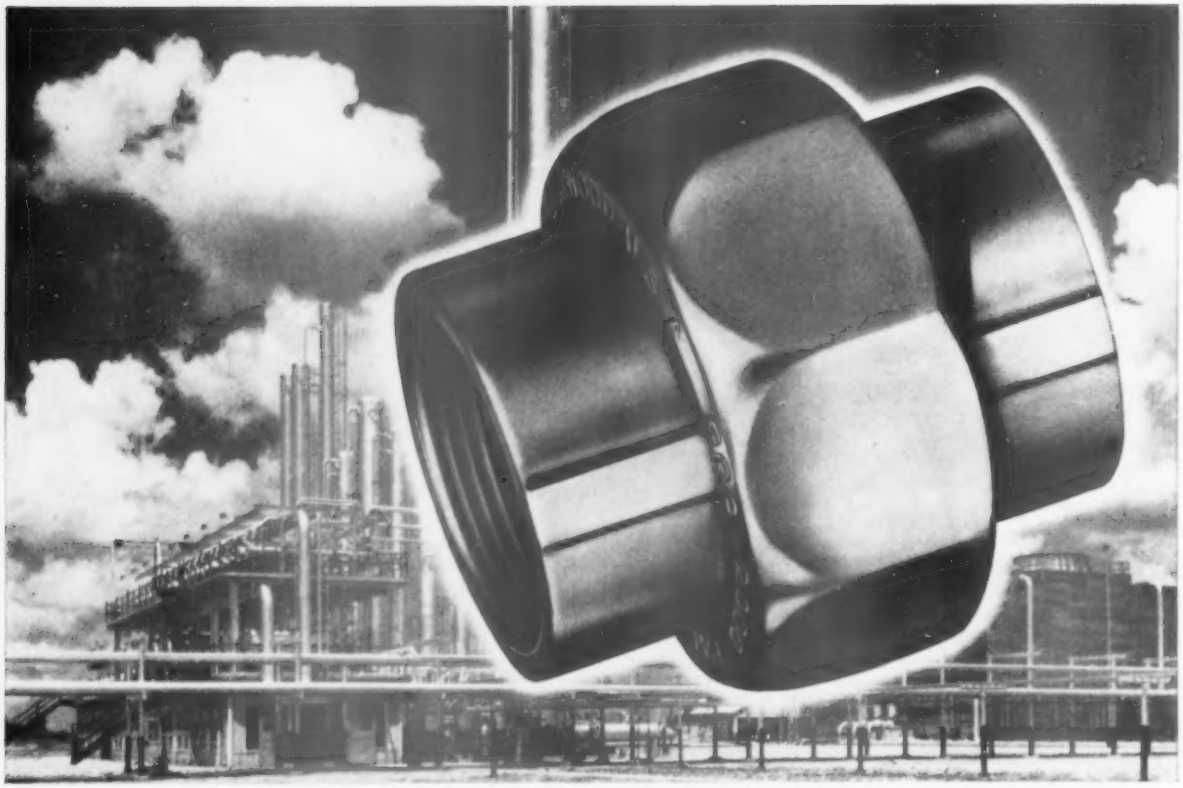
REPUBLIC
Pneumatic Transmitters have these FEATURES

- **ACCURACY** to 1% and in many cases ½ of 1% of maximum range scale
- **RANGE EASILY CHANGED,** reversed, suppressed or compounded
- **SENSITIVE** because minimum movement is required for full scale change
- **RUGGEDLY BUILT** for long service life and overrange protection
- **USES NO SEAL POTS,** mercury or purge
- **EXACT LEVELING NOT REQUIRED**
- **UNAFFECTED** by vibration, ambient temperature variations and changes in line pressure, air supply pressure and fluid density

• *SEND FOR DATA BOOK 1004 TODAY—NO OBLIGATION*

REPUBLIC FLOW METERS CO.

2240 Diversey Parkway, Chicago 47, Illinois



Designed Especially for the Oil and Gas Industries, Rockwood cold-forged steel Unions have been tested and listed by Underwriters' Laboratories, Inc., for use in handling flammable liquids and gases.

More Strength *where you need it most!*

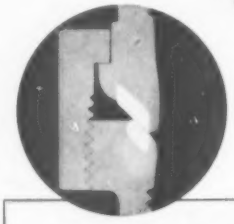
Potential trouble spots get tops in protection when you use Rockwood Unions.

Every detail of their new design is planned to increase your safety margin and cut replacement costs. The breaking load of the 3" size, for example, is 118,000 lbs., for greater resistance to jarring, vibration, expansion and construction-shock. This extra tensile strength is evenly distributed, also, thanks to over-all balance which makes each of the three parts equally rugged.

The non-corrosive seats are double-locked in place under pressures of 100,000 and 400,000 lbs. Being integral with the Union they can't work loose. And their plug-type ball-to-cone construction eliminates sharp corners and edges. You get quick, easy alignment.

Cold forging enables making these seats of either stainless steel or Moly 341, which means no possibility of corrosion at the seat joint. In addition, all Rockwood Unions are "Rockwoodized" against corrosion by a special coating process — and absolute interchangeability of parts completes the list of solid advantages you get when you specify Rockwood Unions. For full information, write Rockwood Sprinkler Company, 104 Harlow Street, Worcester 5, Mass.

Checked For Extra Strength. Determining tensile strength is a typical feature of Rockwood's thorough quality control. Unions are taken regularly from production and tested in this machine. Average breaking loads for the 1", 2" and 3" sizes are 24,000, 82,000 and 118,000 lbs., respectively — extra strength for toughest service.



Special Non-Corrosive Seats are a big Rockwood advantage. Specify Rockwood Type 602 Union with two stainless steel seats — or Rockwood Type 603 Union with two Moly 341 seats.

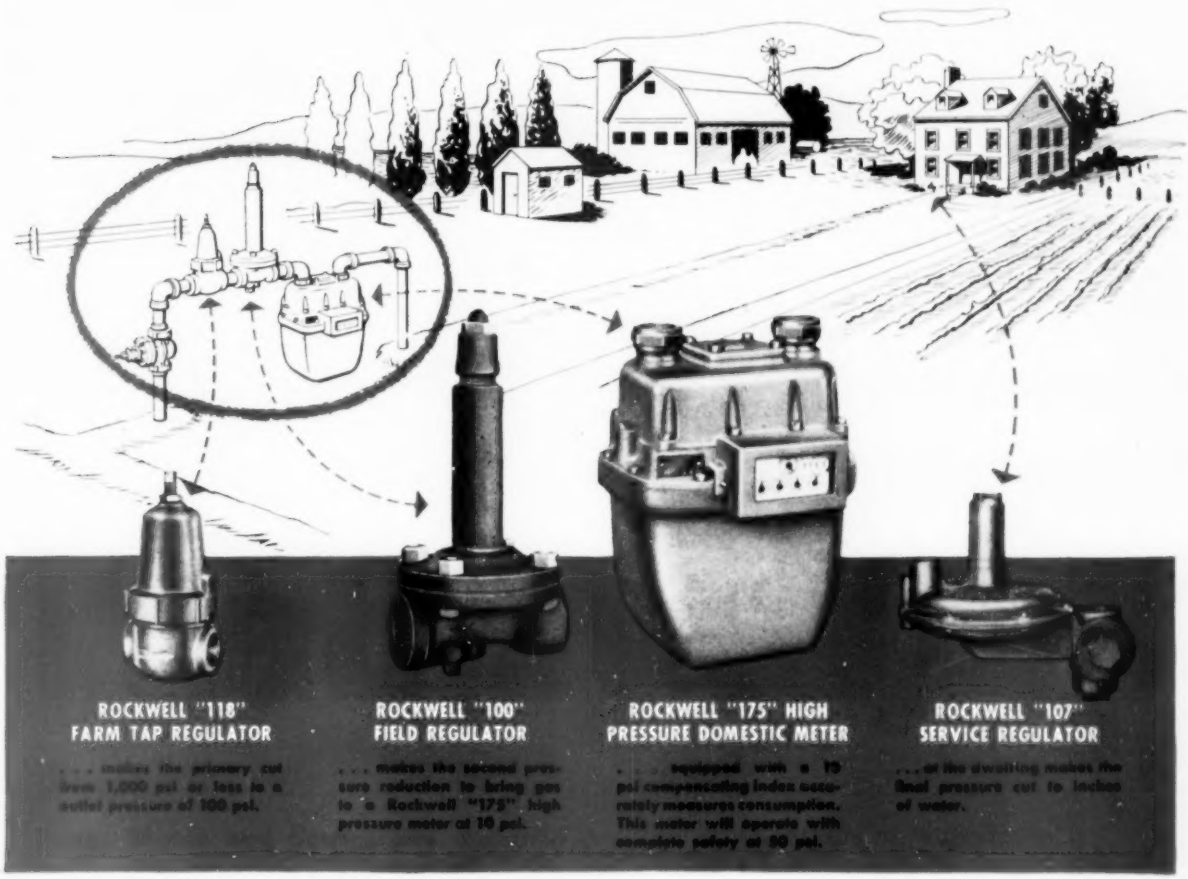
ROCKWOOD

SPRINKLER COMPANY

MANUFACTURERS OF THE MOST COMPLETE LINE OF STEEL UNIONS ON THE MARKET

WORCESTER 5, MASSACHUSETTS

How to
SERVE ISOLATED CUSTOMERS
DIRECTLY FROM HIGH PRESSURE TRANSMISSION LINES


ROCKWELL "118" FARM TAP REGULATOR
. . . makes the primary cut from 1,000 psi or less to a outlet pressure of 100 psi.
ROCKWELL "100" FIELD REGULATOR
. . . makes the second pressure reduction to bring gas to a Rockwell "175" high pressure meter at 10 psi.
ROCKWELL "175" HIGH PRESSURE DOMESTIC METER
. . . equipped with a 10 psi compensating index accurately measures consumption. This meter will operate with complete safety at 50 psi.
ROCKWELL "107" SERVICE REGULATOR
. . . at the dwelling makes the final pressure cut to inches of water.

THE SAFE, SURE, ECONOMICAL WAY

Here's a simple low cost way to serve gas to farms, ranches and small industries in the proximity of your high pressure pipe lines. The two stage method of reduction provides a good safety factor since both the Rockwell "118" and "100" regulators are individually designed to handle high line pressures. Too, by dividing the regulating load, heavy mechanical stress, valve abrasion and wire cutting are eliminated. The Rockwell "175" meter with 50 lb working pressure case is specifically designed for this type of service. It can be furnished with either a standard index or indexes compensating for 10 lb or 50 lb measurement. *Write for full details and prices.*

In Canada: Peacock Brothers Limited

ROCKWELL — You Can RELY ON ROCKWELL

ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA. Atlanta Boston Chicago Houston Kansas City
Los Angeles New York Pittsburgh San Francisco Seattle Tulsa

ALLIS-CHALMERS

PROCESS PUMPS

Allis-Chalmers Type APKK explosion-proof motor. Fin-type design with no enclosed passages for external cooling air. Cannot clog and overheat. If cleaning is required, it takes only a few minutes with cloth, brush, vacuum or air hose. All cast-iron frame resists corrosion. Similar design available in totally-enclosed, fan-cooled motors for non-hazardous locations.

Allis-Chalmers oil-lubricated, frame-type pump. Will handle many process jobs at less cost than usual refinery pump. Available with capacities to 1200 gpm, heads to 250 feet and temperature range to 550 F. Built with wide choice of materials to handle many types of corrosive liquids. Can be provided with six different sealing arrangements, including mechanical seal and water-cooled stuffing box. As you can see from the picture, there is plenty of room between the pump and the bearing for maintenance.

Here's Why An Allis-Chalmers Complete Pumping Unit Is Your Best

Send for Free Engineering Literature

Motors

- ☐ Handy Guide to Motor Selection — 51B6052
- ☐ Explosion-proof Motors (APZZ) — 51B7286
- ☐ Explosion-proof Motors (AZZ) — 51B7149

Pumps

- ☐ Handy Guide to Pump Selection — 52B6059
- ☐ Oil-Lubricated, Frame-type Pumps — 52B7638

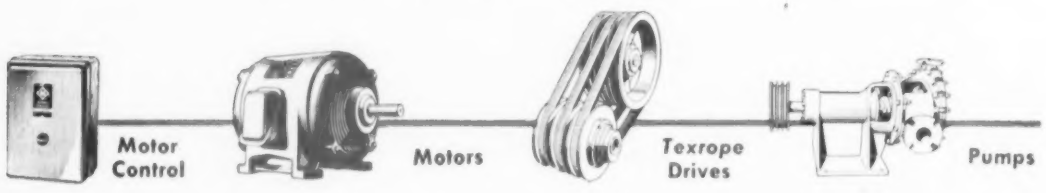
Control

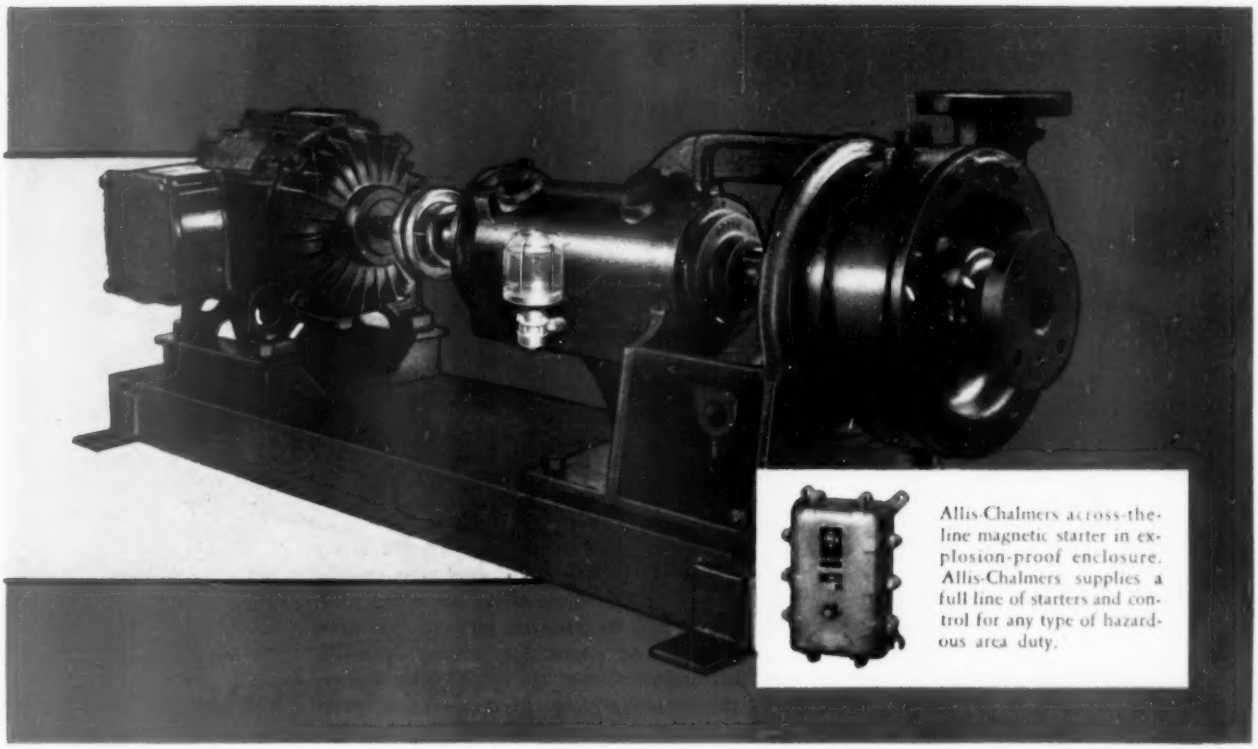
- ☐ Handy Guide to Starters — 14B7733
- ☐ Reduced Voltage Starters — 14B7215

Texrope Drives

- ☐ Handy Guide to *Texrope* Drives — 20B6051

COMPLETE SERVICE *from power line to machine*





Allis-Chalmers across-the-line magnetic starter in explosion-proof enclosure. Allis-Chalmers supplies a full line of starters and control for any type of hazardous area duty.

Pump Buy

Pump, Motor and Control are designed, built, assembled and tested by Allis-Chalmers. With this ready-to-run unit you save engineering time . . . installation costs . . . service problems.

YOU CAN SAVE the time and expense of engineering a pumping unit from several manufacturers' catalogs. Allis-Chalmers will supply the complete pumping unit, with all parts of coordinated design and manufacture, ready to install and run. This engineering service costs you nothing extra.

No Service Problems

The complete unit is guaranteed by one reliable manufacturer, Allis-Chalmers. No buck passing on performance responsibility. Nearly a hundred Allis-Chalmers Certified Service Shops provide factory-approved service in every large industrial area.

Get Complete Information

Get help on your pumping problems by calling an experienced Allis-Chalmers pump application engineer at your nearby Allis-Chalmers District Office.

A-3974

Texrope is an Allis-Chalmers trademark.

ALLIS-CHALMERS

MILWAUKEE 1, WISCONSIN

take a closer look at

TEMPERATURE PRESSURE CORROSION

Periodic review of your operating requirements pays dividends when you discover the *best* alloy tubing for your own specific needs. B&W's wide range of intermediate alloys are being used extensively in a variety of high temperature services. All have earned universal acceptance and praise for giving optimum service satisfaction with economy over the years. The accompanying table shows the extensive range of temperature, pressure, corrosion and oxidation conditions met by B&W Alloy Tubing. Detailed technical data is contained in Bulletin TB-6, available upon request. Mr. Tubes—your B&W Tube Representative—will be pleased to discuss tubing technics with you.

CARBON-MOLY—0.50% Mo—For services to 1050F requiring higher creep strength than carbon steel with no increase in corrosion or oxidation resistance.

CROLOY ½—0.60% Cr, 0.50% Mo—For operating conditions to 1075F requiring properties superior to carbon-moly with respect to graphitization and creep strength.

CROLOY 1¼—1.25% Cr, 0.50% Mo—Economic grade good creep strength properties up to 1100F. Somewhat more corrosion resistant than chromium-free steels.

CROLOY 2—2% Cr, 0.50% Mo—Economic grade for resisting both oxidation and corrosion, with excellent high-temperature strength, up to 1150F.

CROLOY 2¼—2.25% Cr, 1.00% Mo—Exceptionally high creep strength up to 1175F for polymerization and high pressure cracking. Otherwise similar in properties and characteristics to Croloy 2.

CROLOY 3-M—3% Cr, 0.90% Mo—Somewhat better creep properties, and resistance to corrosion and oxidation up to 1175F than Croloy 2.

CROLOY 5—5% Cr, 0.50% Mo—For operating conditions up to 1200F where corrosion resistance is a primary requirement—with creep strength and oxidation resistance superior to Croloy 2.

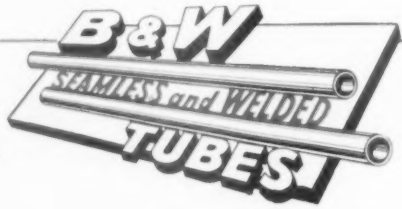
CROLOY 5-Si—5% Cr, 0.50% Mo, 1.50% Si—for operating conditions up to 1300F where oxidation resistance is a primary requirement. Excellent resistance to scaling under straight oxidizing conditions.

CROLOY 7—7% Cr, 0.50% Mo—For operating conditions up to 1250F where corrosion resistance is the primary requirement. Somewhat more oxidation resistant than Croloy 5.

CROLOY 9-M—9% Cr, 1% Mo—For severe operating conditions up to 1300F where high corrosion and oxidation resistance are essential as in hydrogenation processes.

Steels from CROLOY 1¼ upward are electric furnace alloy steels which are normally cleaner and of better quality than open hearth steels. This contributes to greater reliability and improved creep properties at elevated temperatures.

THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION
Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing
Alliance, Ohio—Welded Carbon Steel Tubing



TA-1793 (F)

Biggest seller in its class!

HERE'S WHY

This axle-to-axle check shows Ford's the standout value in the 22,000-lb. G.V.W. class

ADVANTAGES	FORD MODEL F-800	OTHER LEADING MAKES					
		A	B	C	D	E	F
Maximum body and payload —15,366 lbs. or more	✓		✓		✓	✓	
Wheelbases: five or more	✓	✓	✓		✓	✓	
Front axle: Capacity—7000 lbs. or more Tread—69.24 in. or wider	✓ ✓	✓	✓		✓	✓	N.P.
Brakes: Vacuum hydraulic—lining area 485 sq. in. or more Air—lining area 534 sq. in. or more	✓ ✓		✓	✓	✓	✓	
Cab: Deluxe cab available Curved one-piece windshield Total glass area—2103 sq. in. or more Hip room—60.75 in. or more Seat shock snubbers	✓ ✓ ✓ ✓ ✓	✓	✓		✓ ✓		
Engine: V-8 type Max. horsepower—155 or more Horsepower per cubic inch displacement—0.488 or more Max. torque—284 lbs. or more	✓ ✓ ✓						
Frame: Side rail depth—9 in. or more Inside reinforcement Section modulus—13.83 or more	✓ ✓ ✓	✓ ✓	✓ ✓		✓		
Springs: Front—total capacity (at pad)—4500 lbs. or more Rear—total capacity (at pad)—17,400 lbs. or more	✓ ✓	✓	✓			✓	N.P. N.P.
Turning diameter (short wb.): 45.1 ft. or less	✓	✓	✓				
Transmissions: Synchronized type 5-speed direct or overdrive available	✓ ✓	✓	✓	✓	✓	✓ ✓	✓
Rear axle: Capacity—17,000 lbs. or more	✓	✓	✓	✓	✓	✓	N.P.

N.P.—Not Published
Above data based on latest information available as of 8-24-53

Ton-mile master of the Ford Truck line . . . with the most power, yet priced with the lowest in its performance class! No wonder the F-800 BIG JOB is now the biggest seller in its class. It's powered by the ultra-modern, overhead-valve 155-h.p. *Cargo King* V-8. Handles just about any special-purpose body and payload, capacity over 7½ tons. New *Driverized* Cab cuts fatigue, increases driver efficiency.

FORD *ECONOMY* **TRUCKS** { **SAVE TIME** **SAVE MONEY** **LAST LONGER**

FREE! MAIL THIS COUPON NOW!

FORD DIVISION of FORD MOTOR COMPANY
P.O. Box 658, Dearborn, Michigan

Please send me without charge or obligation, complete details on new Ford *Economy* Trucks for '54!

FULL LINE ☐ HEAVY-DUTY MODELS ☐
LIGHT MODELS ☐ BIG JOB MODELS ☐
PARCEL DELIVERY ☐ CAB FORWARD MODELS ☐

Name _____
(PLEASE PRINT PLAINLY)
Address _____
City _____ State _____
T-20 Check here if student ☐

AUTOMATIC TOTALIZING of GAS FLOWS

pneumatic integrator accurately follows even rapidly varying flows

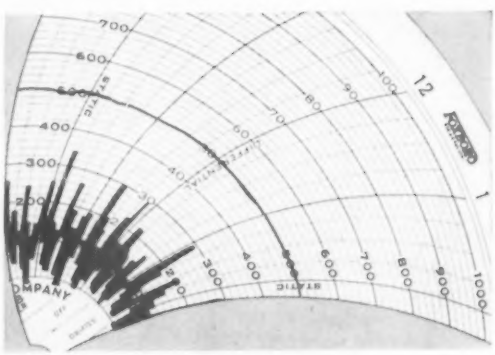
the counter reads directly in units of flow

★ *saves time and cost of planimetering*

★ *eliminates electrical hazard*

Even rapidly varying flows, often impossible to compute "by sight" or with a planimeter, are accurately totalized with the Foxboro Pneumatic Integrator. And the savings over "manual" totalizing will be enjoyed year after year, indefinitely. , , , This simple and easily-maintained device, which is available on all types of Foxboro Flow Meters used in the oil fields, utilizes the flowing gas for its actuating power. Thus the hazard of electricity, or the cost and difficulty of providing a supply of compressed air, is avoided altogether. , , , Many oil field operators are finding the Foxboro Pneumatic Integrator an ideal solution to their gas flow totalizing problems. It is fully described in Bulletin 394 . . . write for your copy. **The Foxboro Company, 6010 Neponset Avenue, Foxboro, Mass., U. S. A.**

The chart record below illustrates a difficult flow pattern which the Foxboro Pneumatic Integrator is successfully totalizing.

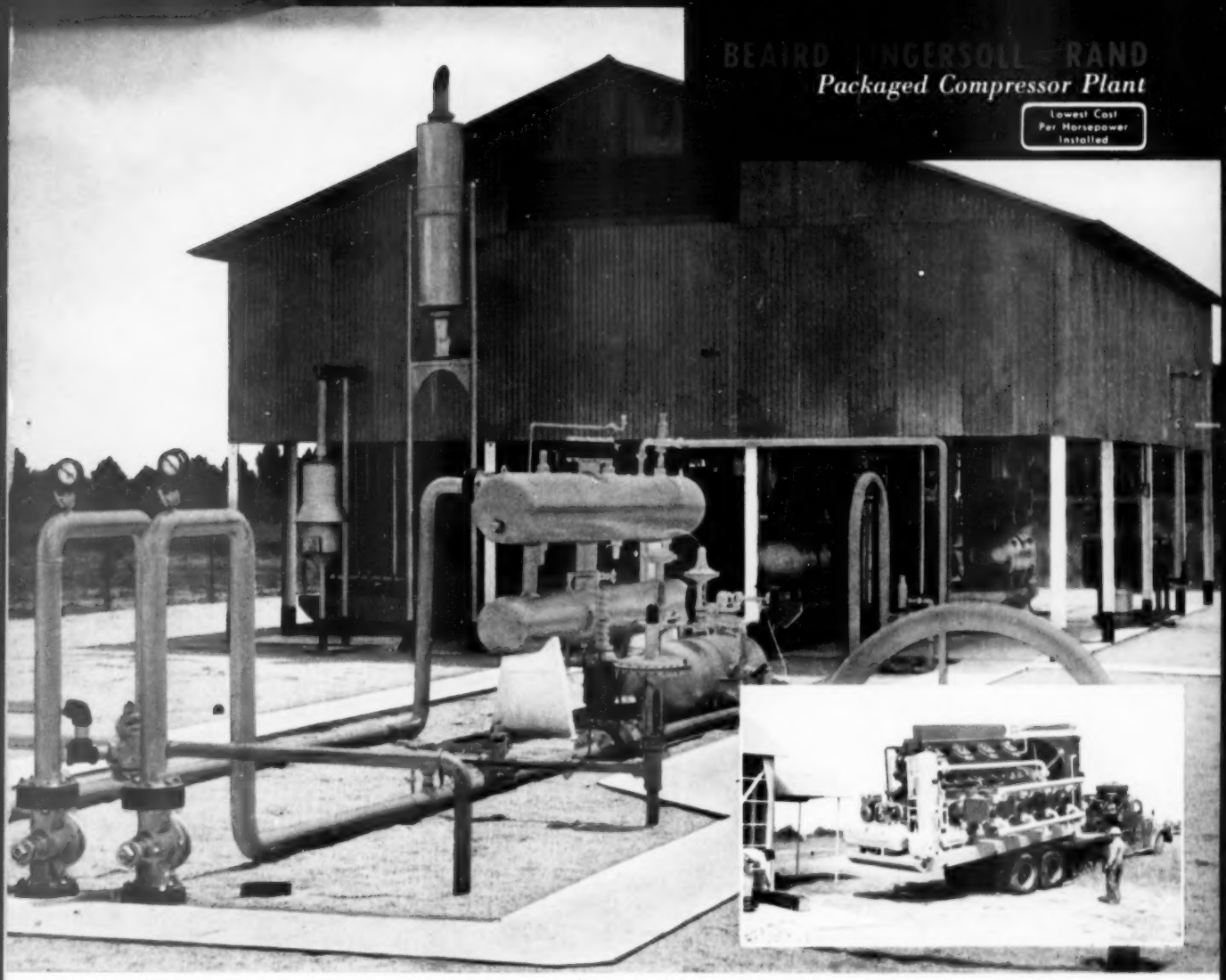


FOXBORO
REG. U. S. PAT. OFF.
Instrumentation

BEAIRD | INGERSOLL-RAND

Packaged Compressor Plant

Lowest Cost Per Horsepower Installed



These two compressor plants were packaged at the Beaird factory and delivered as fully assembled units. Each is complete with Ingersoll-Rand gas engine-driven compressor, Young radiator and all other components normally found in compressor stations. Other sizes are made from 110 h.p. to 550 h.p.

R. E. SMITH has gas wells in Carthage Field, Texas, which, a few years ago, began dropping below gathering line pressures. To maintain required pressures, the company installed a 220 horsepower Beaird-Ingersoll-Rand packaged compressor plant. This handled the job easily until last year when other wells were tied into the station. So they installed a 440 horsepower packaged compressor in addition to the first unit. For the present, the larger compressor is all that is required, but as well pressures drop further the first unit will be put back into operation. Both packaged compressors are so designed and their compression cylinders so sized that they will continue to handle the load down to the lowest well head pressure.

Let us tell you about the economy of using single or multi-unit installations of Beaird-Ingersoll-Rand packaged compressor plants.

Maintain Gas Production —

TWO PACKAGED COMPRESSORS HANDLE DECLINING WELL HEAD PRESSURES

THE J. B. BEAIRD COMPANY, INC.

SHREVEPORT, LOUISIANA

BEAIRD

MACHINING MANUFACTURING STEEL WAREHOUSE

PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE GAS STORAGE

ANHYDROUS AMMONIA EQUIPMENT

LP GAS SYSTEMS

BEAIRD Pressure Storage Tanks

Engineered For Safe Storage

Now ALL Beaird Tanks are X-rayed

You know the advantage of having all shell seams on pressure tanks X-rayed. And now that is standard practice on all our large LP-Gas and anhydrous ammonia tanks — not just spot X-raying — but complete X-raying of entire shell seams. For example, on each 30,000-gallon tank, over 200 separate films are exposed, developed and individually inspected. With these films, our inspectors can literally see through every inch of seam on the entire shell. They know the welding is sound.

That is why we have gone to the expense of installing the most modern radiographic equipment — to assure you that the Beaird tanks you receive are engineered and manufactured for safe storage.

Let us quote you on your pressure storage requirements.

THE J. B. BEAIRD COMPANY, INC.
SHREVEPORT, LOUISIANA

BEAIRD

MACHINING MANUFACTURING STEEL WAREHOUSE

PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE BULK STORAGE

ANHYDROUS AMMONIA EQUIPMENT

LP-GAS SYSTEMS

step on the gas

There's more to racing than breaking speed records. It's a proving ground for engines and fuels that will power our cars in the future. The real goal is maximum engine efficiency.

With the continuing development of the refining processes and the increasing demand for petroleum products, the need for chemicals grows apace. And to supply this growing market, Mathieson has broadened and expanded production. Today, you'll find Mathieson *an outstanding source of more chemicals* essential to petroleum refining and other chemical process industries.

MATHIESON

MATHIESON CHEMICAL CORPORATION
Mathieson Industrial Chemicals Division
Baltimore 3, Maryland

1681

caustic soda • soda ash • liquid chlorine • sulphur • sulphuric acid • bicarbonate of soda • ammonia • sodium nitrate • nitric acid • hydrazine
sodium methylate • sodium chlorite • hypochlorite products • dry ice and carbonic gas • ammonium sulphate • ethylene derivatives • methanol

The Lady was for burning

IN RURAL INDO-CHINA, a farmer once offered a traveler his prettiest daughter in exchange for a reading lamp and a drum of kerosene.

This happened, not fifty years ago, but within the last decade.

It is hard for Americans to imagine what life is like in the "have-not" nations of the world. Some communities in Honduras have never seen petroleum, nor any product thereof. In Western Africa it is not unusual to find one lamp in a tribal group of 15,000 people.

The fact that a country has no petroleum resources of its own is not always the reason for oil poverty. Many so-called "have-nots" live in land where oil could be found. What they really "have not" is the initiative to look for it!

The oil companies of America have a super-abundance of that great natural resource—Initiative. It is essential to their success. They cannot afford to discourage easily, for the odds are ten to one against a wildcat becoming a producer.

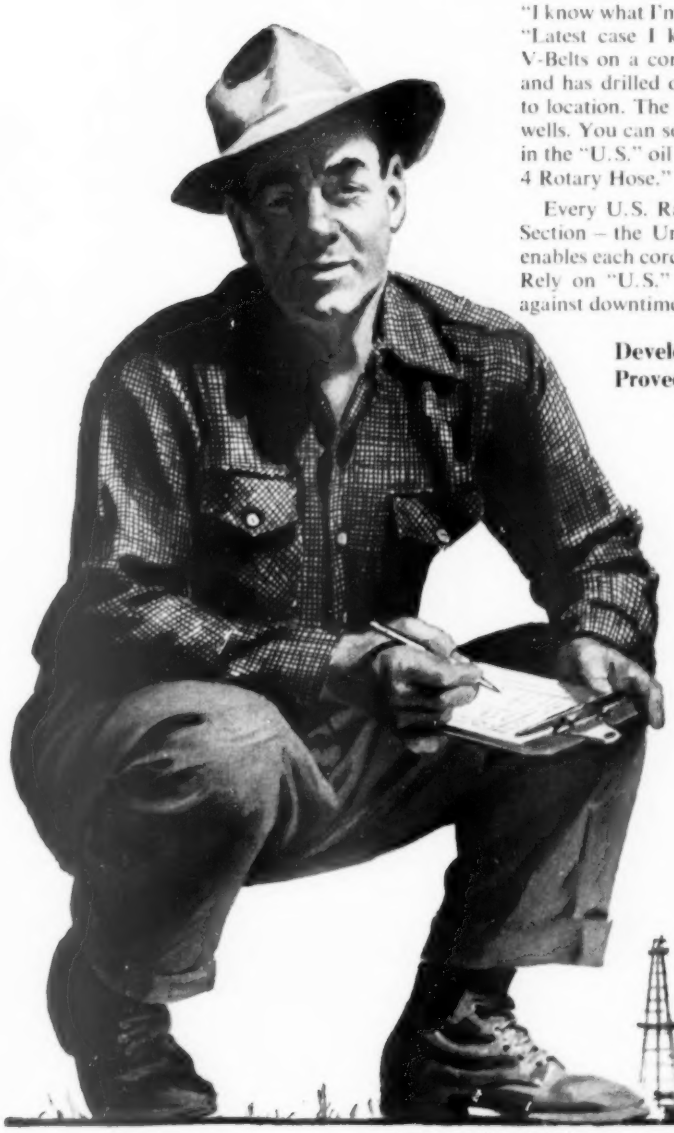
In spite of these odds, Cities Service has discovered some of America's historic oil fields. In the last five years, its geologists have added millions of barrels of much-needed oil to our national reserves. Because of these men, and others like them throughout the industry, we can be sure our country will never be one of the petroleum have-nots of the world.

CITIES SERVICE

Quality Petroleum Products

"I wanted V-Belts loaded with guts . . . and I sure got 'em in U. S. Rainbow®!"

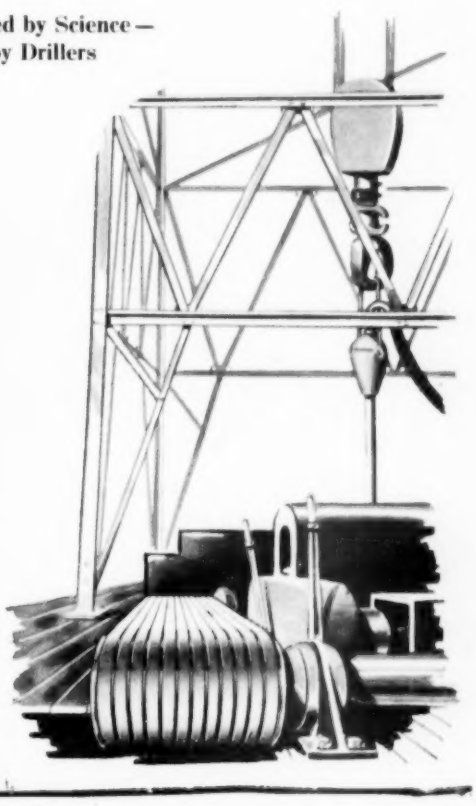
says "Red Royal"



"I know what I'm talking about," says this hard-driving toolpusher. "Latest case I know is a Texas contractor* who put Rainbow V-Belts on a compound drive. So far he's used them 43 months and has drilled over 218,970 feet of hole, moving from location to location. The brand of belts used *before that* failed after three wells. You can see why Rainbow's for me. That goes for anything in the "U.S." oil field specialty line—like, for instance, U.S. Royal 4 Rotary Hose."

Every U.S. Rainbow V-Belt has the unique Equa-Tensil Cord Section – the United States Rubber Company development that enables each cord to pull its full share of the load—for *extra* power. Rely on "U.S." to give you *quality* and help you in the fight against downtime.

Developed by Science—
Proved by Drillers



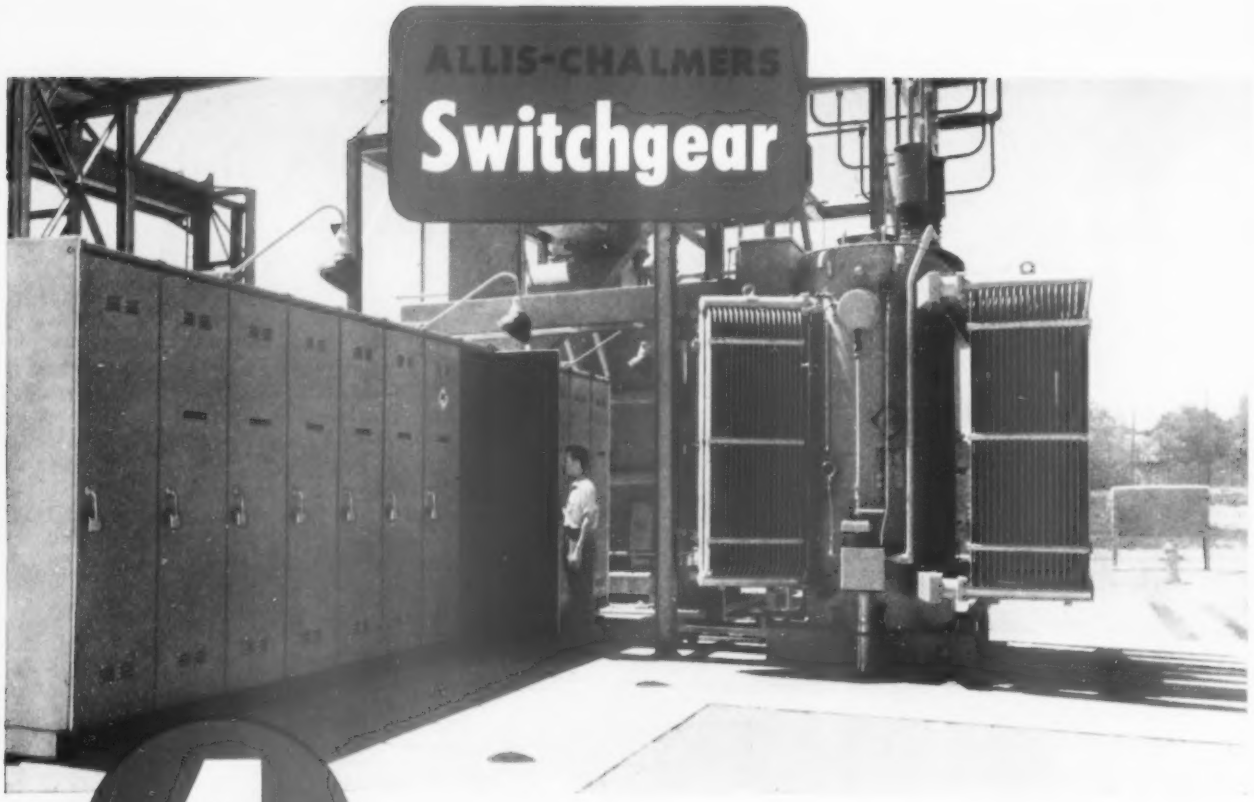
*Stringer & Richards Drilling Co., Corpus Christi, Texas

Available in all FIELDS at SUPPLY STORES

PRODUCT OF U.S.RUBBER SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.



4 WAYS to Guard Against Power Interruption

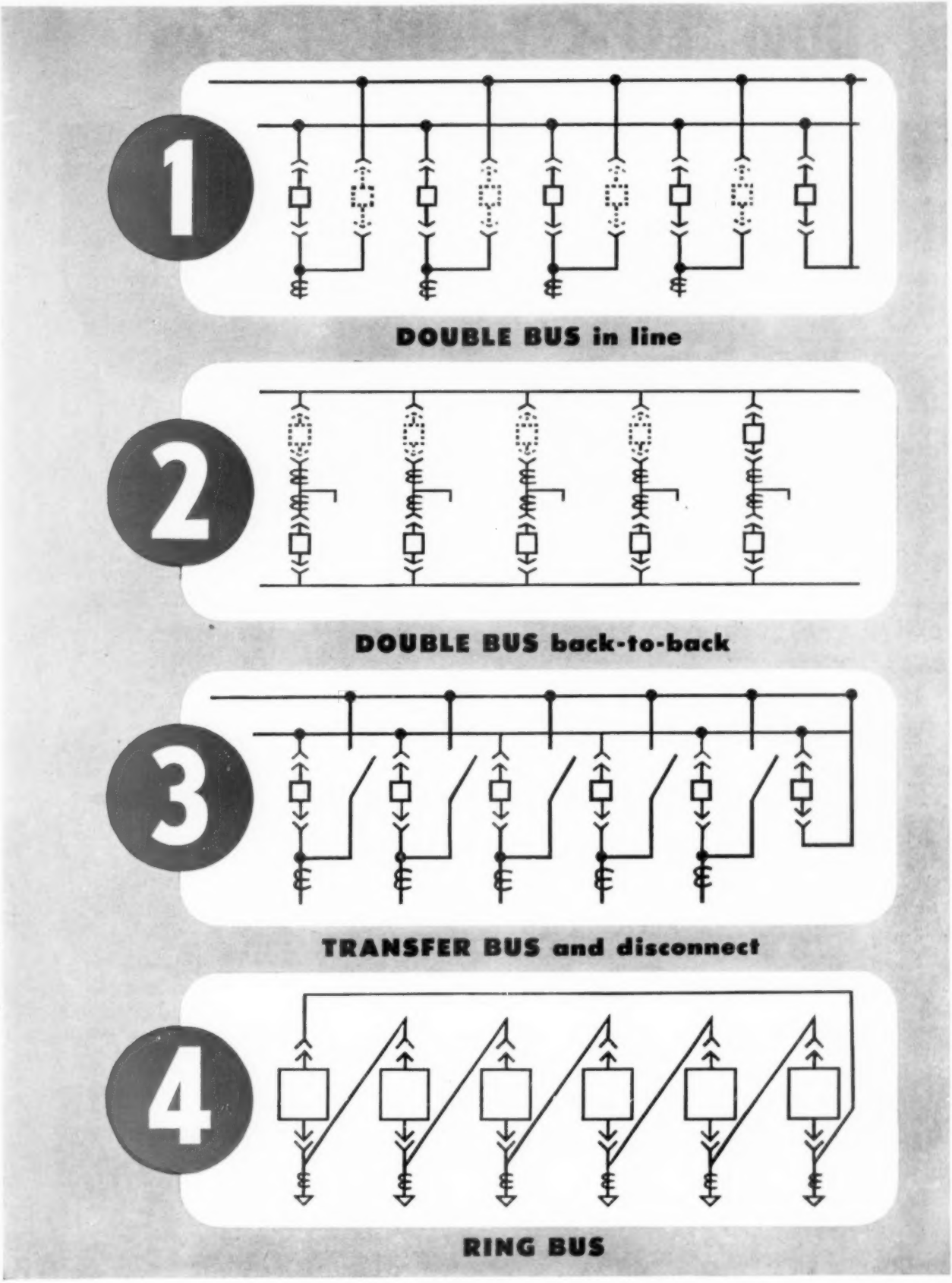
Here are a few of the many different circuit arrangements Allis-Chalmers can provide. All are designed to assure continuity of service. Each one is specially suited for specific situations.

With Allis-Chalmers switchgear, all these circuit schemes have one advantage in common. Each arrangement shown can be built into standard units of Allis-Chalmers metal-clad switchgear without adding extra cubicles. This economy and simplicity, plus the obvious space savings, make Allis-Chalmers equipment especially attractive.

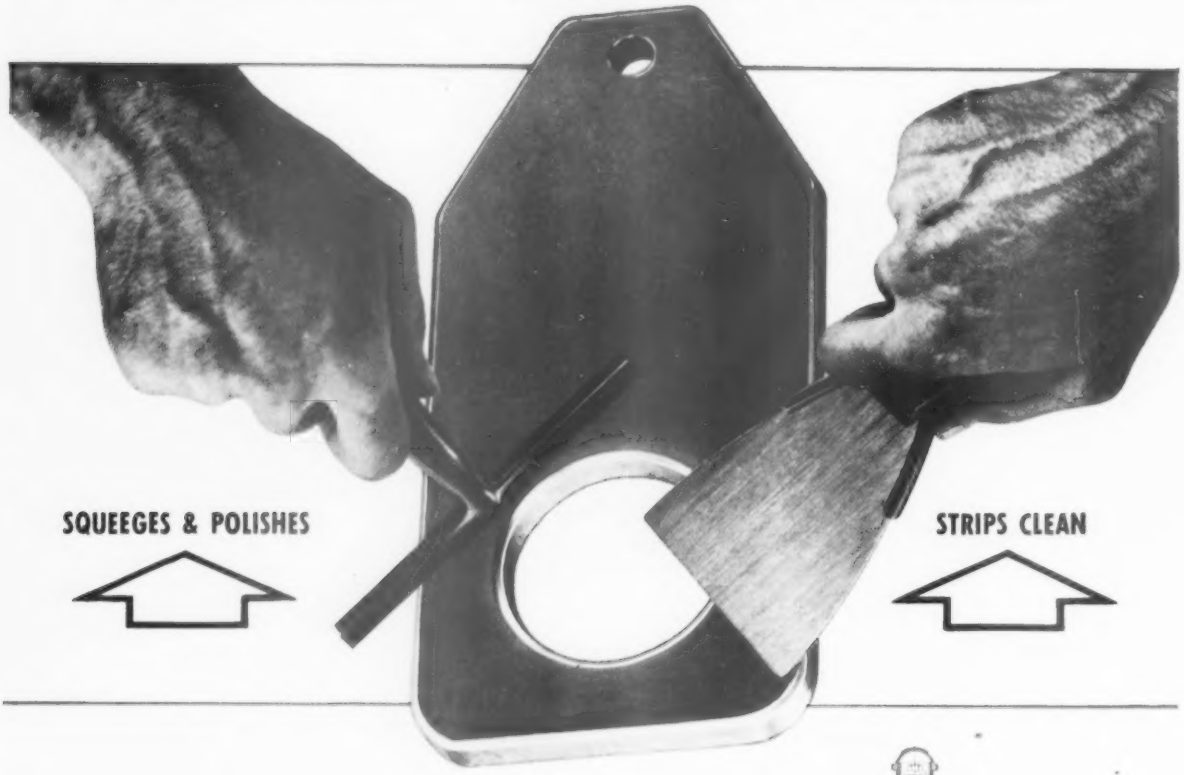
Which Arrangement is Best? A study of your problem is needed to answer this question. Any one of these arrangements may be best for your plant. Or maybe an entirely different scheme is needed. In any case, Allis-Chalmers engineers can help you work out the best scheme for you . . . one that provides ✓ economy, ✓ simplicity, ✓ space saving, and ✓ uninterrupted service.

For complete information, call your nearby A-C district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4135

ALLIS-CHALMERS


1
DOUBLE BUS in line
2
DOUBLE BUS back-to-back
3
TRANSFER BUS and disconnect
4
RING BUS

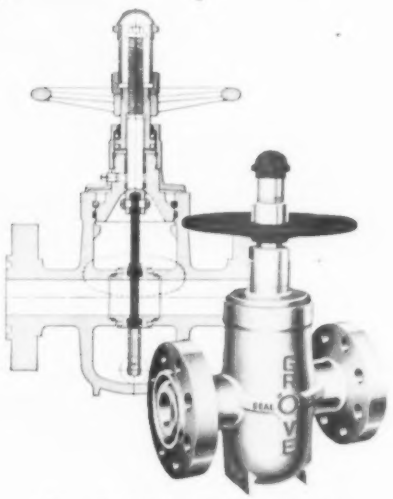
Dual SELF-CLEANING Action



—Keeps seating surfaces clean for tight shut-off Steel seat sleeve assemblies are in constant contact with full opening port-plate, and embody resilient "O" ring seals for dual cleaning and sealing action. Employing the sliding contact principle, Grove SEAL-"O"-RING Gate Valves keep precision seating surfaces stripped clean and polished with each operation of the valve, to insure positive tight shut-off. No lubricants, wedges or other packing devices are employed. Grove "O" Rings are inherently tough and durable for long service. Investigate how Grove Valves *put pressure to work*—the more pressure the tighter the shut-off seal.

Write today for Grove SEAL-"O"-RING Valve Bulletin No. G-53. Request complete engineering details and prices.

Available through leading oil field supply houses



Streamlined inside and out in a broad range of sizes for production and pipe line services

GROVE SEAL-"O"-RING Gate Valves

GROVE REGULATOR COMPANY • 65th & Hollis Sts., Oakland 8, California
HOUSTON 4—1901 Calumet St. • **LOS ANGELES 14**—649 So. Olive St. • **NEW YORK 17**—415 Lexington Ave.

GROVE
SIMPLICITY
ACCURACY
SAFETY

CORPUS CHRISTI, TEXAS	ODESSA, TEXAS	DALLAS, TEXAS	TULSA, OKLAHOMA	LAFAYETTE, LOUISIANA	DENVER, COLORADO
4534 No. Baldwin Blvd.	2604 Kermit Highway	1334 Fidelity Union Life Bldg.	318 Thompson Bldg.	101 Berkeley Street	2669 Cherry Street

Carey 85% MAGNESIA INSULATIONS

RIDE HERD ON COSTS FOR GULF IN TEXAS

. . . still going strong after 24 years of tough refinery service

At Gulf's Port Arthur, Texas, refinery, miles of Carey insulation keep fluids at constant temperature, save thousands of fuel dollars . . . help Gulf refine better products at less cost!

This record of service dates from 1929, *yet the original insulation is still on the job* . . . still *riding herd* on costs after 24 years of punishment by blistering sun, blustering wind, and unmerciful vibration, expansion and contraction of equipment.

Development and manufacture of products to conserve heat and power has been an important Carey contribution to industry since 1873. That's why we believe we can solve your heat and power conservation problems, unusual though they may be.

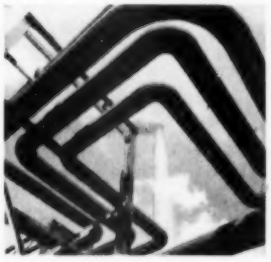
The Carey line of high and low temperature insulations includes new, monolithic Super-Light 85% magnesia in precision-sized blocks and nesting "O.D." pipe coverings, blankets, pipe wrapping and jackets, blocks, loose and granulated wool, and cements.

Let Carey help you plug up those dollar-leaks. Use coupon to request the latest bulletins describing Carey insulating products or the services of a qualified Carey Industrial Sales Engineer.

More recent Gulf Oil installations have been made by: B & B Engineering & Supply Co., Insulation Contractors, Houston, Texas; The Lummus Co., Engineering Contractors, New York City, N. Y.

Carey Insulation has weathered 24 years of continuous service on the fractionating tower and vapor lines of these atmospheric and vacuum stills at Gulf Oil Corporation's Port Arthur, Texas plant.

Another Carey product—Careystone Corrugated Asbestos-Cement Roofing and Siding—protects Gulf Oil Corporation's warehouse at Port Arthur, Texas. Careystone won't corrode, rot, rust or decay; never needs paint or preservative treatments; is virtually maintenance-free!



"Worm's eye" view of live and exhaust steam lines insulated with Carey insulations. Besides the usual hazards of expansion, contraction and vibration, this Carey installation stands up under the extremely hot, humid weather of the Gulf area.

FROM THE HOUSE OF CAREY

Insulation • Built-up Roofing • Careystone Roofing and Siding • Careyduct • Asphalt Plank • Asphalt Paints and Coatings • Industrial Flooring, • Other Famous Products for Industry Since 1873

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☐ *Please have a Carey Industrial Sales Engineer call on me.*

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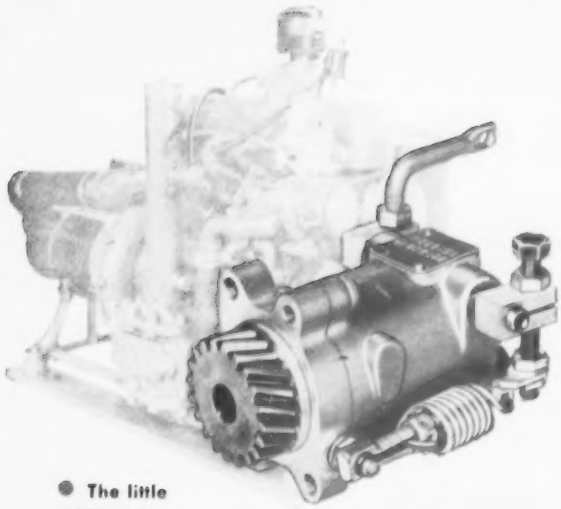
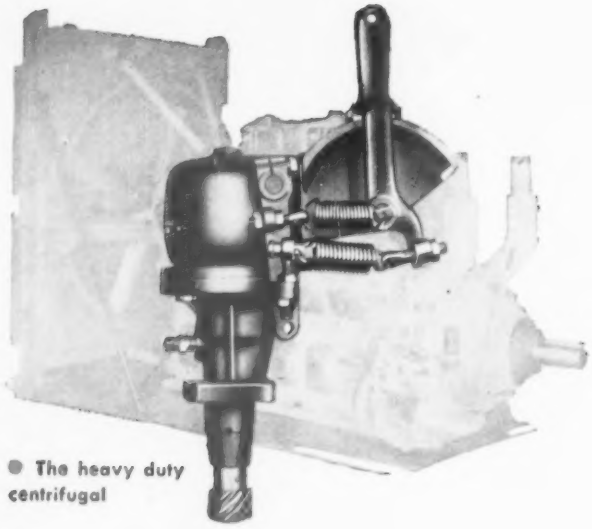


● The little 1400 series



● The heavy duty centrifugal

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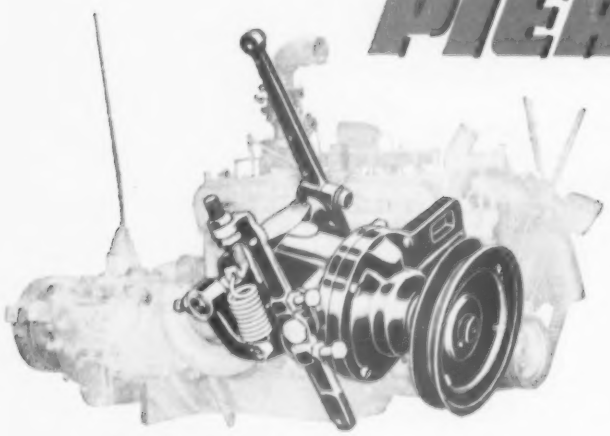
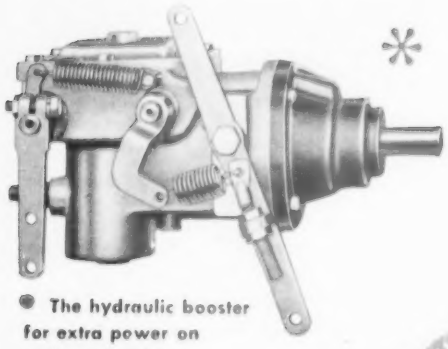
preferred for gas (LPG), gasoline and diesel industrial engines... big, medium and small



● The standard long range 900 series



● The hydraulic booster for extra power on racks and valves

Pierce centrifugal governors are your most economical and efficient control mechanisms for industrial engines . . . from small generator sets to monster power units . . . gas (LPG), gasoline or diesel. For engines requiring extra power to position fuel rack or valve, the Pierce centrifugal with hydraulic booster * (for original equipment only) is ideal! Service is locally available . . . your nearby Pierce Service Station is equipped for all types of Pierce Governors.

Specify PIERCE Centrifugal governors on your engines . . . for economical, thoroughly dependable control in industrial applications.

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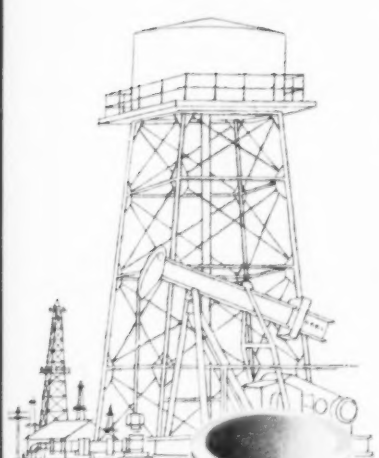
SPANG "CW" STEEL PIPE



Need a water piping system at your well site? You'll be ahead with SPANG "CW" Steel Pipe obtainable through your nearby National Supply Store.

For all oil country piping—water systems, oil-gathering systems, or gas piping, salt water disposal lines, air lines, water flooding lines—SPANG "CW" is always a good buy. In the first place, it's a dependable SPANG product—secondly, it has an established reputation for oilfield serviceability.

Furthermore, SPANG "CW" Steel Pipe is normally available through your National Supply Store in a complete range of standard sizes.

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THE NATIONAL SUPPLY COMPANY

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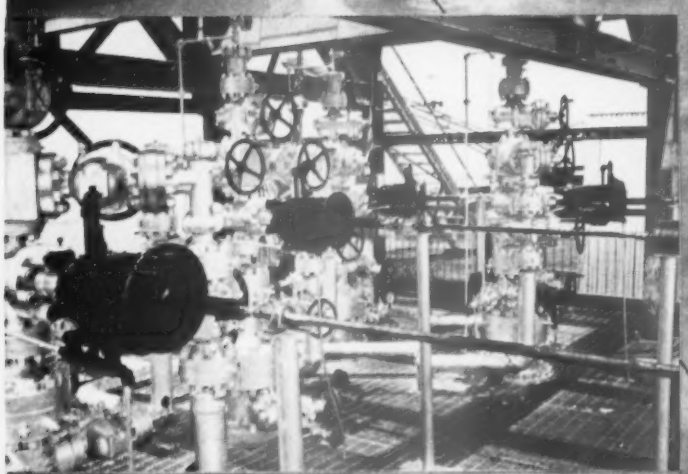

It's just like fishing with a heavy test line when you install E-I-M Valve Controls. You can be sure that the well won't get away from you because E-I-M has a record of safety and dependability. Our engineers can solve your transmission problems with E-I-M Valve Controls for oil or gas lines off shore or across the continent.

The Pure Oil Company's platform in Bellevue Field, 9 miles off the Louisiana coastline, has four producing wells, each using an E-I-M Valve Control for maximum safety to protect personnel and the platform.

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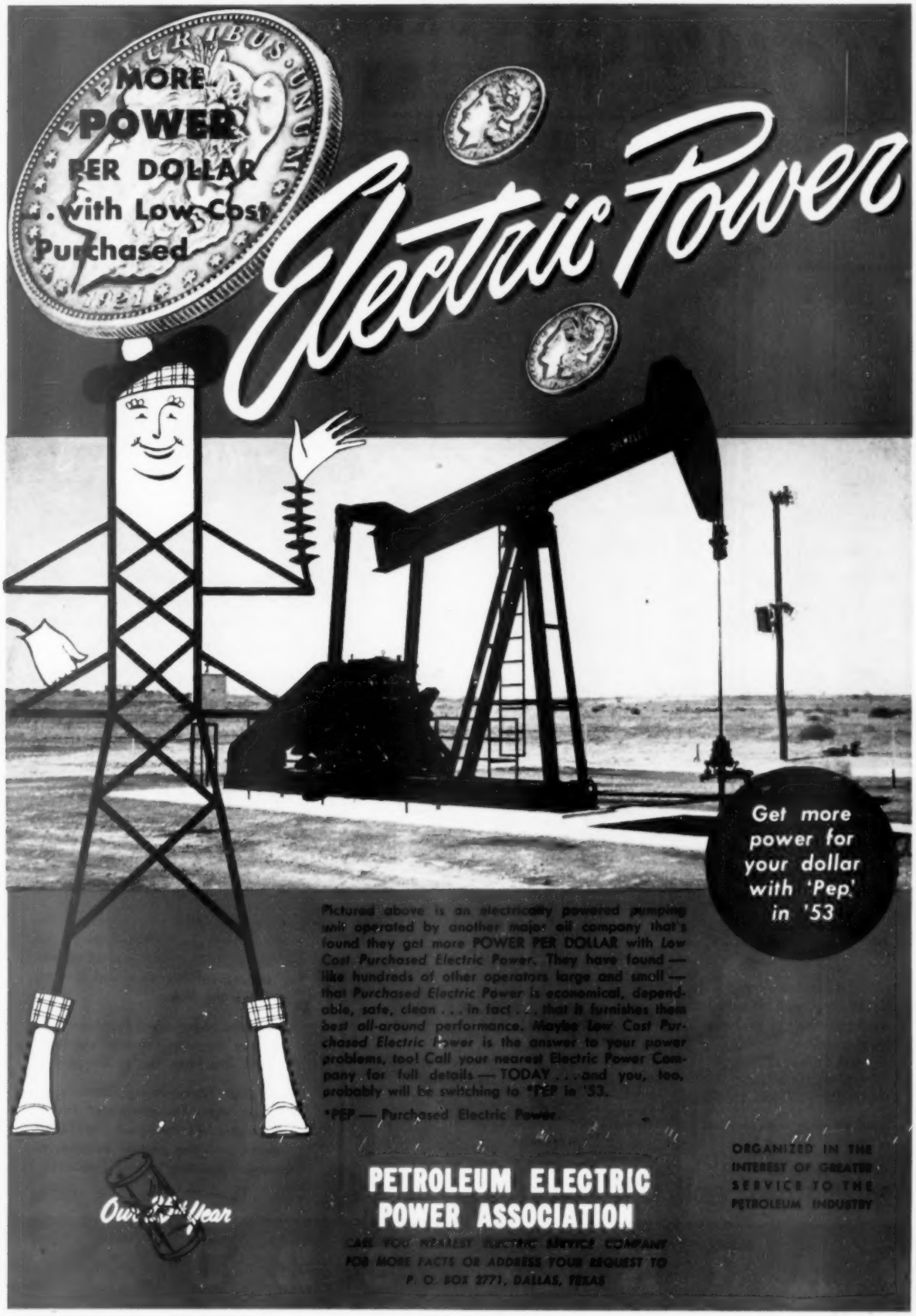
Valve Controls • Speed Reducers • Cooling Tower Drives • Control Valves


MORE
POWER
PER DOLLAR
...with Low Cost
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Get more power for your dollar with 'Pep' in '53
Pictured above is an electrically powered pumping unit operated by another major oil company that's found they get more POWER PER DOLLAR with Low Cost Purchased Electric Power. They have found — like hundreds of other operators large and small — that Purchased Electric Power is economical, dependable, safe, clean . . . in fact . . . that it furnishes them best all-around performance. Maybe Low Cost Purchased Electric Power is the answer to your power problems, too! Call your nearest Electric Power Company for full details — TODAY . . . and you, too, probably will be switching to "PEP in '53.
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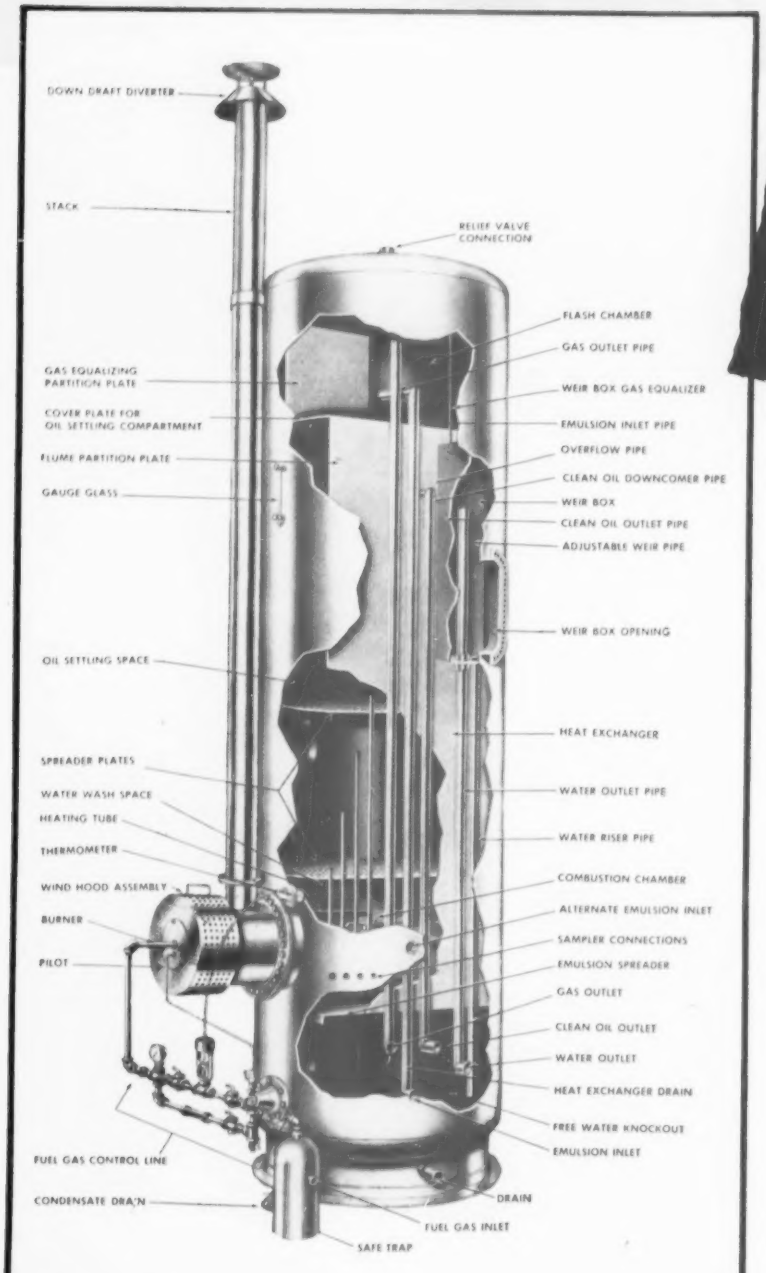
ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

NOW! YOU CAN FORGET TREATER TROUBLES IN COLD CLIMATES



8322

PARKERSBURG NEW WINTERIZED TREATER

We've designed this NEW WINTERIZED TREATER so that ALL PIPING, INCLUDING THE WEIR BOX, is inside the treater.

This means:

. . . the inlet and discharge pipes, rising to top of treater, reduce radiation loss, always a treater problem in cold climates.

. . . discharge water won't freeze because weir box and water discharge pipe are inside treater.

. . . easier housing of all controls because piping connections are grouped close to firebox.

. . . additional pre-heating of the emulsion as it rises through the inside inlet pipe to top of treater before spilling over and flowing down the flume.

. . . the rearranged fire tube provides increased water capacity with less heat loss to the water.

Ask your Parkersburg Representative or write for complete details about our Winterized Emulsion Treater . . . the perfect solution to emulsion treating in cold climates.

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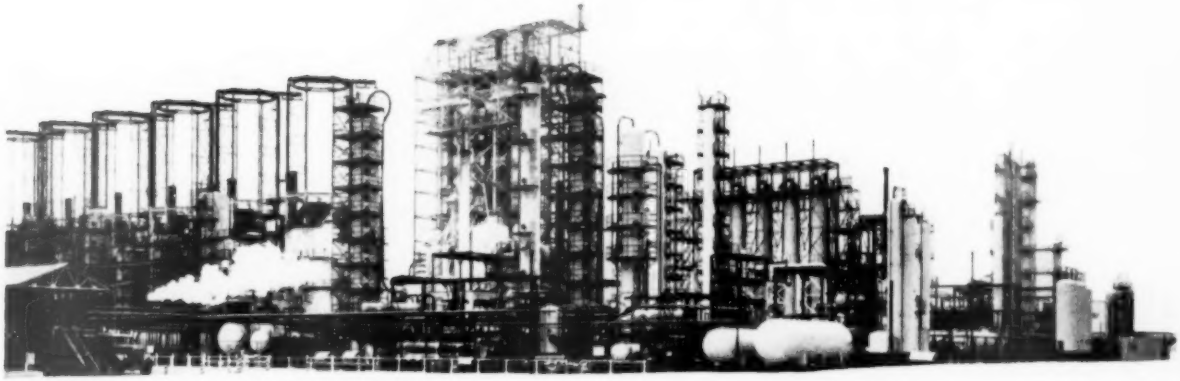
Manufactured in Houston, Texas

Problem: Scheduling a 38,383,000 barrel refinery program one full year in advance



Solution: A Consolidated Model 21-103 Analytical Mass Spectrometer

Richfield Oil Corporation's huge, fully-integrated California refinery processes an average of 105,000 barrels of crude oil daily into a complete petroleum product line. Using a single CEC Analytical Mass Spectrometer one operator completed 6,787 analyses in 1952 on a single-shift basis. Management now plans to double this outstanding performance by running two shifts. The amazing accuracy, speed and reliability of this single instrument enables management (1) to catalog the exact composition of each and every process stream in the refinery; (2) maintain a refinery-wide sample analysis program; (3) assemble information to establish master production programs for each ensuing year. A 1% error in the analysis of a small portion of a refinery's process-streams can cost far more in lost product value in a single year than the cost of a Consolidated Mass Spectrometer completely installed.

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analytical instruments for science and industry

Analytical Mass Spectrometer

The Consolidated Analytical Mass Spectrometer shown above is used extensively by leading refineries throughout the world for analytical research as well as process control. For complete information on this instrument, write for Bulletin CEC-1800B-X11.

PIPE LINE PROGRESS

Dope gang preparing a string of A. O. Smith 26-inch welded steel line pipe for lowering in on the West Texas Gulf Pipe Line.

Biggest Inch to carry 381,000 bbl. per day from Permian Basin area

The West Texas Gulf Pipe Line, completed last February, is the largest single carrier of crude oil in this country. It has 465 miles of 26-inch pipe which extends from Colorado City in west Texas to Lucas, just outside Beaumont.

Present capacity of 301,000 barrels per day is being increased to 381,000 by the addition of intermediate pumping stations. Ultimately, capacity can be increased further to an estimated 440,000 barrels per day.

Crude oil from the Permian Basin area, containing more than 20% of the nation's oil reserves, is delivered to the Beaumont area and, through a 20-inch branch of 112 miles, to Longview, Texas, where it connects with other pipe lines serving Great Lakes and Ohio River valley refineries.

A considerable mileage of the 26-inch line is of A. O. Smith welded steel line pipe produced in Milwaukee and Houston. We are proud to have contributed to the construction of this, the Biggest Inch, as we have also to virtually every important petroleum products pipe line in the world.

A. O. Smith Line Pipe is available in a complete range of sizes and wall thicknesses, from 8⅝-in. to 36-in. diameters.

FIRSTS by A. O. Smith: Welded line pipe • Internally expanded pipe • Light-wall large-diameter pipe • World's largest producer of large-diameter welded steel pipe.

The A. O. Smith Casing Mill is operating at capacity to supply vitally needed casing for the Oil and Gas Industry.

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10 POINTS That Spell

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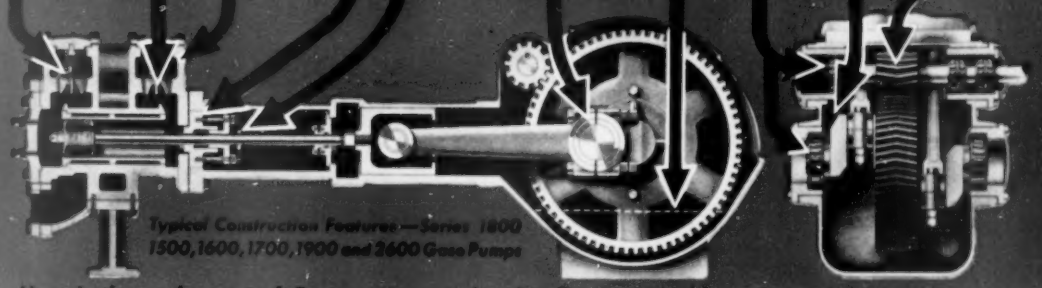
- U — LARGE VALVE OPENINGS
- R — INDIVIDUAL VALVE CHAMBERS
- A — DEEP STUFFING BOXES
- B — NO OVERLAPPING OF RODS
- I — BABBITT LINED SHELL BEARING
- L — FLOOD LUBRICATION
- I — LARGE ROLLER BEARINGS
- T — ALLOY STEEL CRANKS
- Y — ALLOY STEEL LAPPED HERRINGBONE GEARS



Typical Construction Features—Series 1800 1500, 1600, 1700, 1900 and 2600 Gaso Pumps

Here is the real secret of Gaso supremacy in pipe line pumps. It's engineering—engineering that starts with molybdenum alloy cast-iron with a tested tensile strength of 45,000 to 48,000 pounds per square inch, and extends to every detail of design. To specify Gaso is such a simple way to be SURE of the extra life and performance that sound engineering represents.

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GASO PUMPS

for every oil industry need

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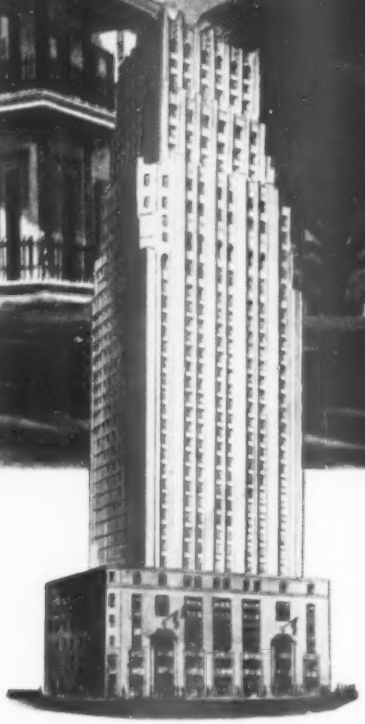
THE NATIONAL BANK OF COMMERCE of HOUSTON . . . in MISSISSIPPI?



Yes-and in all of these states for OIL and GAS LOANS

In Mississippi, as in other great oil producing states, The National Bank of Commerce is ready, willing, and able to be of service to oil operators. The same prompt, confidential, specialized oil and gas loan service that you would get if you were right in Houston. You deal with oil men who are thoroughly familiar with the oil business . . . men who speak your language.

Like the scores of successful oil operators who have come to The National Bank of Commerce for counsel and financial assistance, you, too, are invited to discuss your problems with us.

E. O. BUCK, VICE PRESIDENT, OIL LOAN DEPARTMENT

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Precision bevelled at the ends, Claymont Welded Steel Pipe can always be counted on for accurate fit . . . fast and easy field welding. Can be depended on, too, for unvarying uniformity of size, straightness and roundness because it's hydraulically expanded and hydrostatically tested.

Claymont Welded Steel Pipe is made from steel plates produced in our own plants and carefully controlled through every phase of fabrication starting with the open hearth. It's supplied in standard lengths of 40 feet and in overall diameters from 22 inches through 36 inches. Special lengths and diameters where required. For complete information write or call Claymont Steel Products Department, Wickwire Spencer Steel Division, Claymont, Delaware.

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Complete Booster Service!

Gas Injection!

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Whether your requirement is for Booster Service, Re-pressuring or Air-Gas Lift, you'll have more efficient and dependable service through installation of Gardner-Denver Compressors. They come in a range of capacities and pressure ratings for all field conditions and are designed for your specific needs.

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Apply Directly Over Sound Rusted Surfaces

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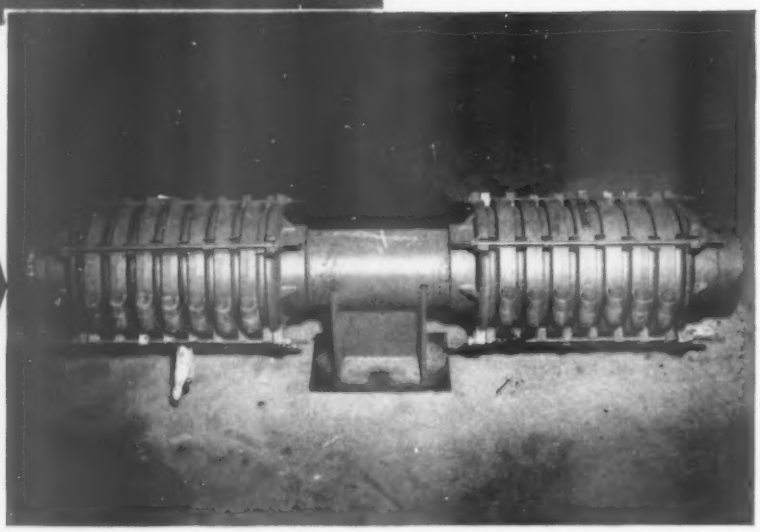
THIS STEAM LOSS WAS STOPPED FOR LIFE...

WHEN THIS FLEXON EXPANSION JOINT WAS INSTALLED



THREE TYPES AVAILABLE

FREE-FLEXING—*Available in sizes from 3" through 48" I.D. in copper or stainless steel. Suitable for pressures to 30 psi, temperatures from minus 20° F. to 800° F.*

CONTROLLED-FLEXING — (Illustrated above) *Available in sizes from 3" through 48" I.D. in copper or stainless steel. Suitable for pressures to 300 psi, temperatures from minus 20° F. to 800° F.*

FLEXONIFLEX—*Integral ring type. Available in sizes from ½" pipe through 6" pipe. Suitable for pressures to 5500 psi, temperatures from minus 400° F. to 1600° F.*

Steam loss through antiquated expansion joints in the shipyard where the upper photo was taken was calculated at over $17,500 per year before modern Flexon Expansion Joints were installed. Flexon Expansion Joints cannot leak . . . they are uni-metal assemblies which when properly installed become a part of the pipe. Unlike the joints which they replaced in this shipyard, Flexon Expansion Joints require no maintenance . . . there is no packing to take up or replace. Just install them and forget them.

If you're letting dollars escape through leaky, troublesome expansion joints, ask your Flexonics representative to show you how Flexon Expansion Joints can put an end to this problem, or write for the Flexon Expansion Joint Bulletin.

Flexonics *Corporation*

EXPANSION JOINT DIVISION

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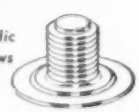
Flexon identifies products of Flexonics Corporation that have served industry for over 50 years.

Flexible metal hose

Expansion joints

Aircraft components

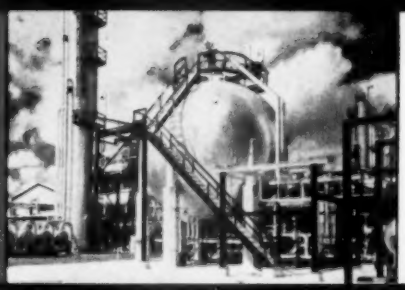
Metallic bellows



TO INCREASE REFINING EFFICIENCY

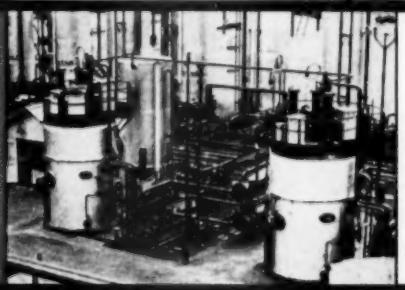
PETRECO
ELECTRIC PROCESSING

DESALTING



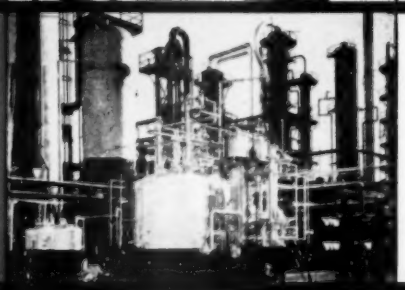
Petreco *Electric* Desalting eliminates salts, solids, and other impurities with such a high degree of efficiency that salt difficulties are eliminated – *enabling refiners to run more crude.*

LUBE OIL TREATING



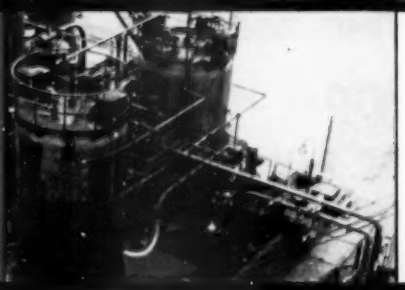
Petreco Lube Oil Treating is an automatic, continuous method for acid-treating lube oils and similar stocks. It is carried on in a closed system, under pressure. High efficiency acid contacting results in minimum acid usage, negligible oil entrainment in sludge, and maximum product quality.

DISTILLATE TREATING



Petreco *Electric* Distillate Treating takes the guesswork out of distillate treating. It is applicable to acid, alkali or doctor treating all distillate stocks. It permits continuous, automatically controlled treating with minimum equipment, handling and attention.

DESAPONIFICATION



Where caustic is added to crude prior to distillation, ash-forming materials resulting from such caustic are often present in fuel stocks. Petreco *Electric* Desaponification removes about 85% of such ash-forming constituents, enabling fuel stock to be marketed or used as a cracking charge.

For complete information, call or write

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PETRECO DIVISION

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CRUDE OILS: REMOVAL OF SALTS, SOLIDS, OTHER IMPURITIES; DEHYDRATING

LUBE OILS: CONTINUOUS, AUTOMATIC ACID-TREATING

DISTILLATES: ACID TREATING; CAUSTIC TREATING; DOCTOR TREATING

FUEL OILS: DESAPONIFICATION, ASH REMOVAL

FOR OIL-WELL PUMPING...

"All motors are NOT alike!"

RELIANCE
Precision-Built
MOTORS

Typical Reliance Splashproof Motor designed for oil-well pumping service. All other standard enclosures available, with wide choice of mechanical and electrical designs and special mountings. Ratings from ¼ to 300 hp.

- ☆ Heavy shafts . . . bearing to bearing
- ☆ Indestructible pressure-cast rotors
- ☆ Shock-resistant frame and bearing-bracket construction

. . . AND THE BEST PRE-LUBRICATED BEARING DESIGN
The Reliance pre-lubricated bearing provides *four times more operating hours without re-lubrication* than any other bearing used in motors today. And—whatever your lubrication schedule—*you just can't grease 'em wrong!* To get the complete "inside story" on motor bearings, write today for Bulletin B-2201. It contains hard facts on the advantages of the Reliance pre-lubricated bearing design, with cutaway view, cross-section diagram, comparison chart, and statements by bearing manufacturers. B-1858

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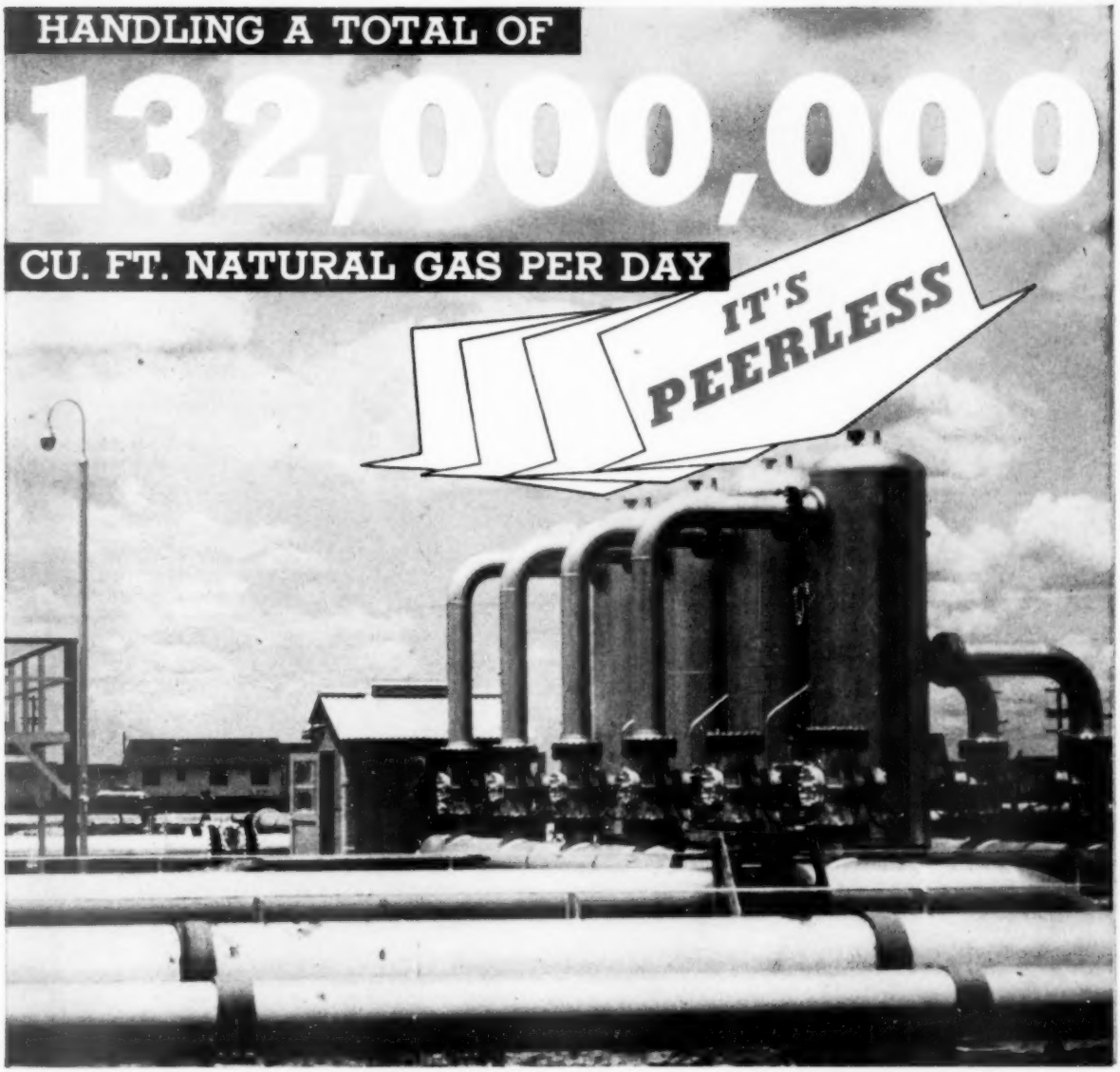
132,000,000

CU. FT. NATURAL GAS PER DAY



The ***BEST SCRUBBERS*** for PIPELINES, GATHERING SYSTEMS, COMPRESSOR STATIONS, PLANT INLET SCRUBBERS

WRITE FOR OUR NEW SCRUBBER BULLETIN No. 150

Pictured above are FOUR Peerless 60" x 19' Vertical Scrubbers, handling a total of 132,000,000 standard cu. ft. of .60 sp. gr. natural gas per day at 600 PSIG working pressure. These scrubbers are located at a new pipeline compressor station and are used to prevent liquid, in the gas stream from getting to the compressors.

For the most complex liquid separation problem . . . CONSULT PEERLESS!

PEERLESS MFG. CO.

PEERLESS MANUFACTURING CO.

P. O. BOX 7193 ★ DALLAS, TEXAS ★ DIxon 8431

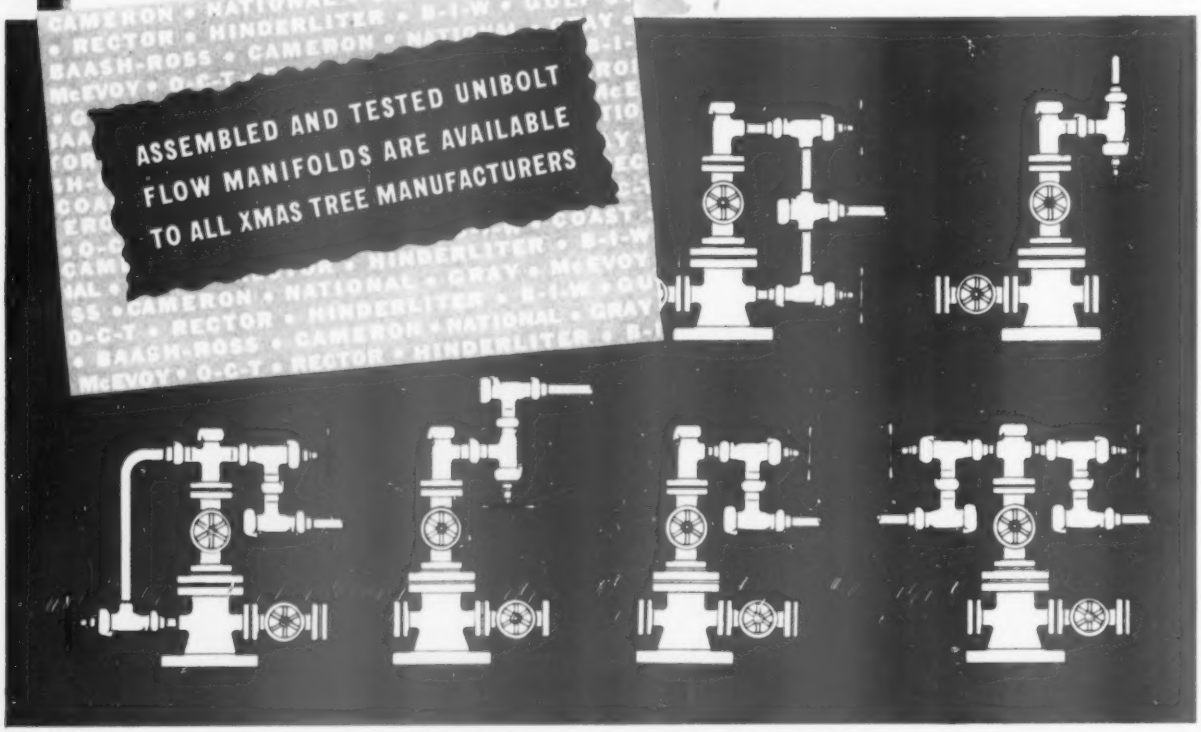
REPRESENTATIVES IN ALL PRINCIPAL CITIES

from here up make it UNIBOLT and make it a better tree

Ask your Christmas tree supplier to furnish UNIBOLT Flow Manifolds (everything above the master valve). These compact, completely salvageable manifolds, consisting of a Tee or Cross, Adjustable Wing Valve, and Positive Choke Body, are pressure-tested as a unit and may be assembled in a number of combinations to best meet individual needs.

Employing standard UNIBOLT connections rather than flanges, the UNIBOLT Flow Manifold is many pounds lighter, yet the UNIBOLT design, which places more metal in shear, actually results in a higher factor of safety for the manifold.

Furnished in regular forged steel or in high-chrome alloy for corrosive wells — 6000, 10,000 and 15,000 lbs. test.



THORNHILL CRAVER CO.

P. O. BOX 1184 HOUSTON, TEXAS

Why pay for the steel you waste when you make hollow parts?

WHEN you make hollow parts from bar stock, you pay for chips and shavings you bore out and throw away! With Timken® seamless tubing, you eliminate this waste. The hole's already there. Finish boring is often the first production step. You cut machining time—get more parts per ton of steel.

You make your machine tools more productive by using Timken seamless tubing. Screw machine stations normally used for drilling can be released for other jobs. You get added machine capacity without additional machines.

To save you even *more* steel, the Timken Company's engineers will study your problem and recommend the most economical tube size for your hollow parts job—guaranteed to clean up to your dimensions.

Timken seamless tubing has fine forged quality. That's because the piercing process by which it is made is basically a forging operation. It gives the tubing a uniform grain flow for greater strength and a refined grain structure which brings out the best in the quality of the metal. The Timken Company's rigid quality control makes sure the quality is always uniform from tube to tube and heat to heat. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

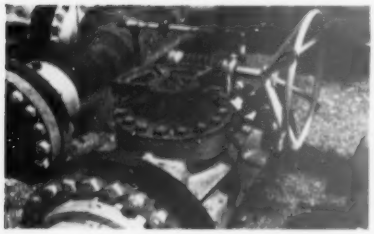
YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

Non-retarded straight-through flow

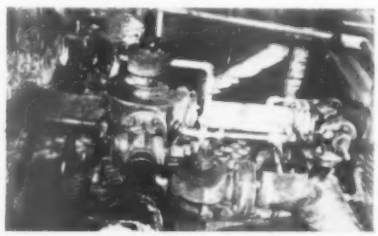
. . . is guaranteed by a.c.f.'s Round Port Valves because the valve opening is *exactly* the same size and shape as the pipe itself.
As a result you get full capacity flow of heavy viscous ladings, no loss in head pressure. Materials in suspension have no abrasive effect.

Full pipe area and the non-wedging effect of CYLINDRICAL Plug Design is also available in a.c.f. Rectangular Port Valves. It will pay to get all the facts about *both* before you buy. Call your nearby a.c.f. Representative now or write direct for information.



IN PETROLEUM AND GAS INSTALLATIONS a.c.f. Valves provide full flow with no pressure loss, fastest sure operation.

IN PROCESSING a.c.f. Round Port Valves are ideal for such materials as cement slurry with straight-through uninterrupted flow.

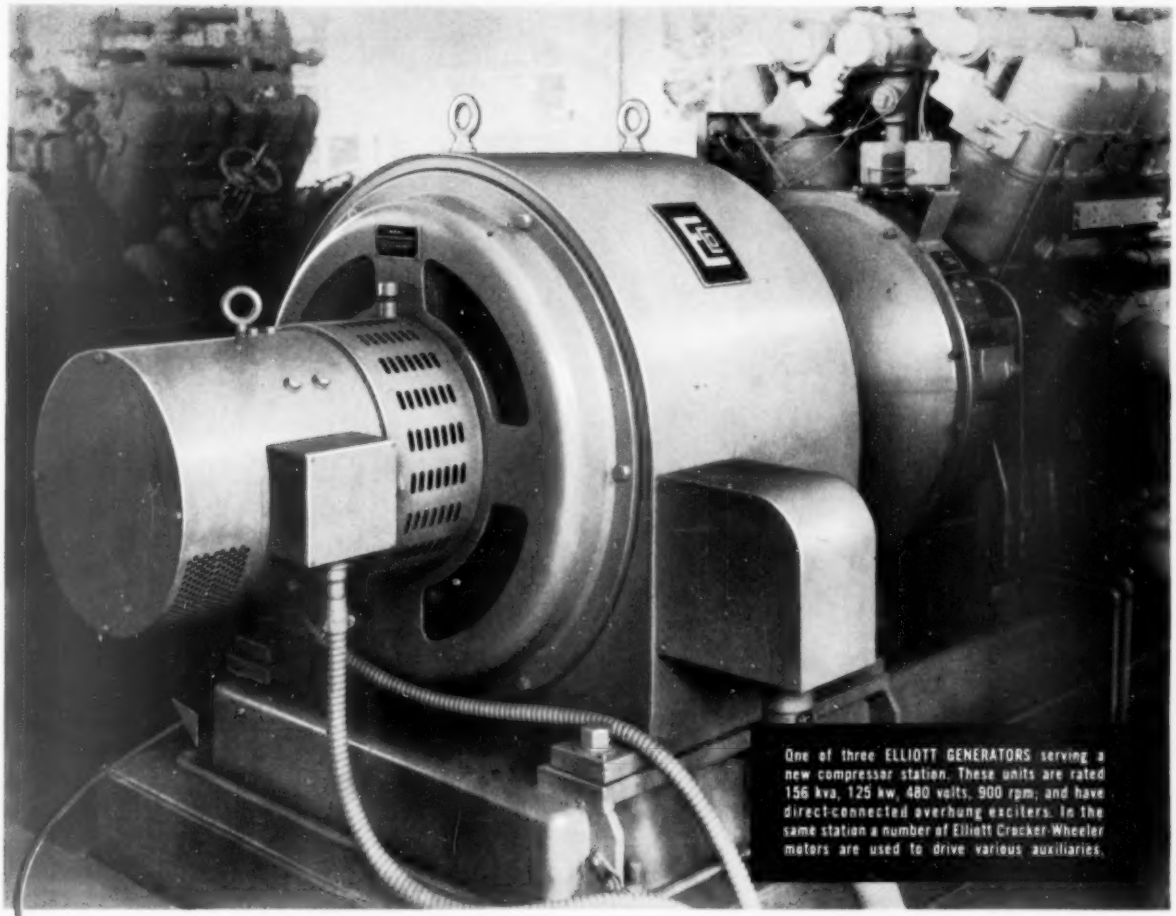


TWELVE YEARS OF SERVICE for these a.c.f. Valves handling hot asphalt is evidence of service-free performance.

a.c.f. CYLINDRICAL FULL PIPE AREA **PLUG VALVES**

Write for Catalog 4. American Car and Foundry Company, Valve Division, 1501 E. Ferry Ave., Detroit 11, Michigan.

Representatives in 50 Principal Cities



One of three ELLIOTT GENERATORS serving a new compressor station. These units are rated 156 kva, 125 kw, 480 volts, 900 rpm; and have direct-connected overhung exciters. In the same station a number of Elliott Crocker-Wheeler motors are used to drive various auxiliaries.

FOR PIPE LINE STATIONS THAT MAKE THEIR OWN POWER

ELLIOTT GENERATORS

Provide —

1. *Reliable* electrical energy for installations not conveniently located near electrical power systems.
2. *Economical* generation with fuel available at the site.
3. *Convenient* operation and maintenance with available plant operating personnel.

For full details on Elliott generators particularly adapted to this type of service, see your local Elliott representative or write Elliott Company, Ridgway, Pa.

ELLIOTT Company
RIDGWAY DIVISION

FOR MOTORS 1-200 HP: CROCKER WHEELER DIV. AMPERE, N. J.

R3-3

At this very moment, hovering over your plant, fire is ready to swoop down on storage spaces, electrical generating equipment, record vaults.

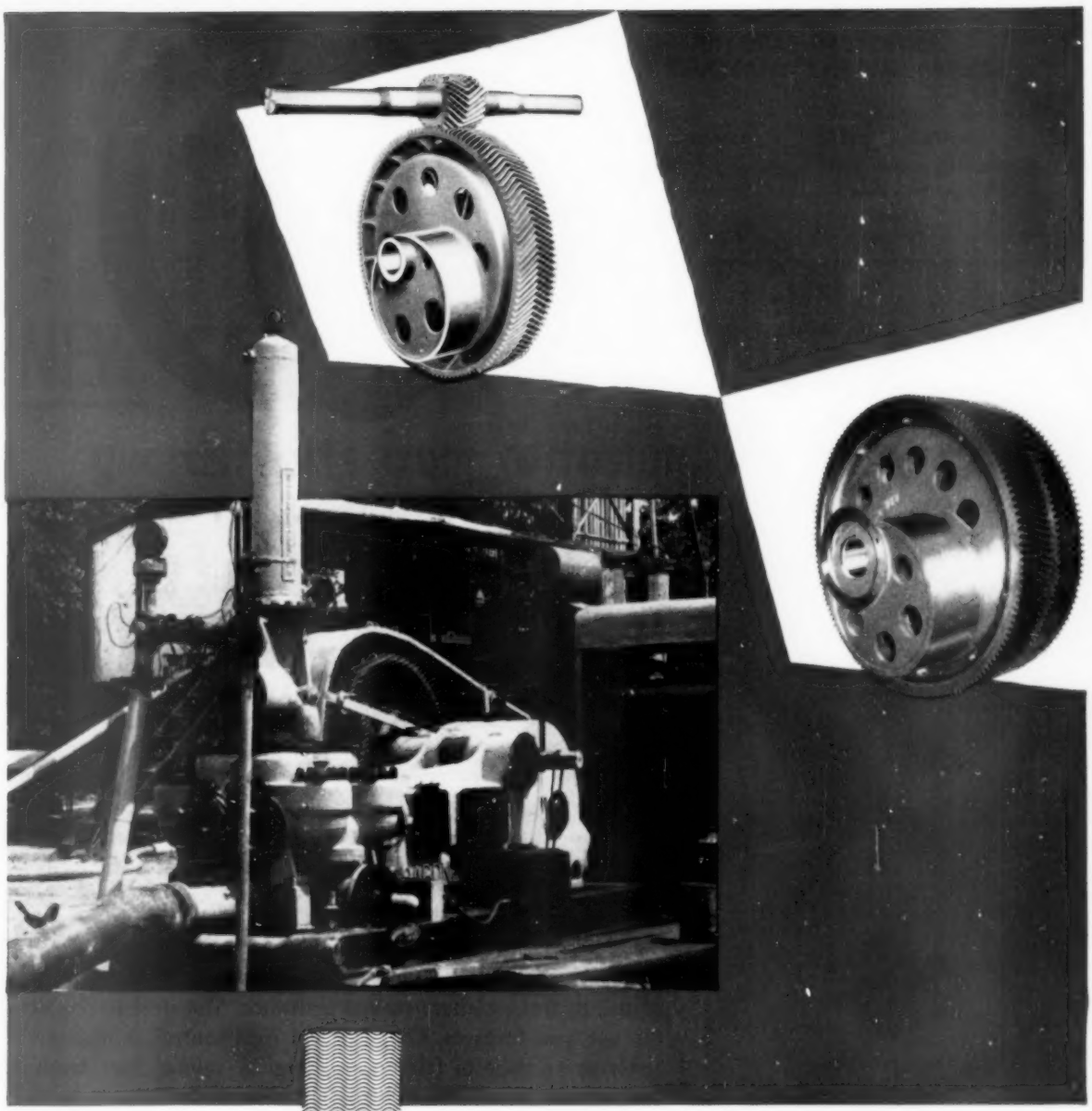
But like a bird of prey, it casts a warning shadow... IF you have a KIDDE Industrial Smoke Detector.

Kidde

Walter Kidde & Company, Inc.

1054 Main Street, Belleville 9, N. J.

Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.



Dallas • Houston • Tulsa • St. Louis
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Continental Supply Co.,
Continental Bldg., Dallas, Texas
Export Division: 30 Rockefeller Plaza, New York, N. Y.

Republic Supply Co., (Of Calif.),
2600 S. Eastland Ave.,
Los Angeles, Calif.

S-M-O-O-T-H!

The precision-cut herringbone or double helical gears on a Gardner-Denver Mud Pump transmit power smoothly—withstand sudden high plunger loads without flinching. For complete specifications, ask for Bulletins FX-10 and P-70.

SINCE 1859

GARDNER-DENVER

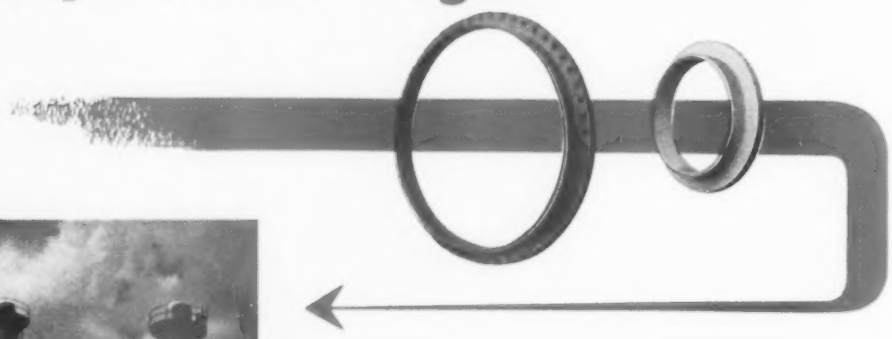
Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd.,
14 Curity Avenue, Toronto 13, Ontario

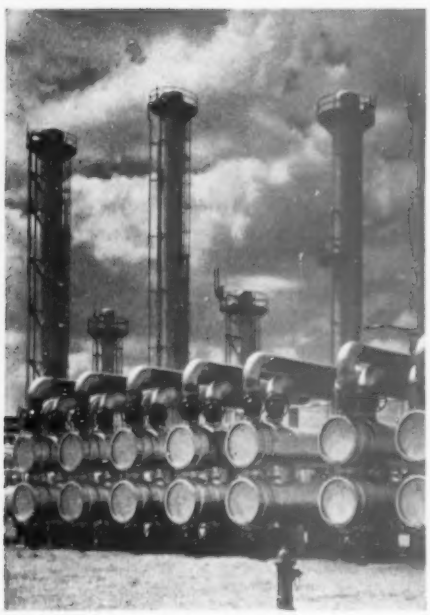
THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

for better connections—

Specify

Railway Steel Flanges





The flanges on your heat exchangers, pressure vessels and piping are among the most important safeguards your products have. Using top quality Railway Steel flanges assures you top performance in every application.

Alloy and carbon Railway Steel flanges are made from start to finish by our metallurgists and craftsmen. The steel is produced in our own furnaces. Complete and rigid control is maintained over every stage of fabrication—forging, rolling, heat treating, machining. Railway Steel flanges are made in a wide range of sizes and sections from 18 in. ID to 150 in. OD. . .all standard types, plus special types including flanges to meet TEMA specifications.

See our sales representative in Chicago, Cleveland, Houston, New York, Richmond, San Francisco, St. Louis, St. Paul or Tulsa* for full information about Railway Steel flanges.

**Ardun Supply Company*

Railway also fabricates weldless rings for use as brake rims, gear blanks and circular forgings of many types. All are forged of our own steels assuring top performance, complete dependability, long life.

Railway Steel Flanges

RAILWAY STEEL-SPRING DIVISION

AMERICAN LOCOMOTIVE COMPANY

Where can **YOU** use a wearproofing metal with these qualities ?

PHYSICAL PROPERTIES OF CARBOLOY® CHROME CARBIDE

High hardness	Low magnetic permeability
Corrosion resistance	Wear resistance
Steam erosion resistance	Low electrical conductivity
Oxidation resistance	Metallic lustre
Heat resistance	Low density (compared to tungsten carbides)

NEW CARBOLOY® CHROME CARBIDE

guards parts from corrosion, abrasion, erosion

If valves, spray nozzles, pump seal rings or other equipment parts wear out rapidly from corrosion or erosion, we suggest that you try wearproofing them with Carboloy Chrome Carbide.

Grade 608 Chrome Carbide (not a cutting metal) is the first in a new Carboloy series of metallic carbides designed to lengthen equipment life where acids, alkalis, heat, oxidation and the like are most troublesome.

Its lightweight and nonmagnetic features offer possibilities for use in bearing applications in electronic and magnetic equipment. Because Grade 608 retains most of its properties at high temperatures due to its extreme acidation resistance, it is considered well suited for orifices for application on equipment exposed to extreme temperatures brought about by the processing of gases, liquids and metals.

Chrome Carbide seems to offer outstanding possibilities in the applications listed below. Send coupon for technical bulletin CC-100.

TYPICAL SHAPES made of Carboloy Grade 608 Chrome Carbide now being produced for industry.

SUGGESTED APPLICATIONS for Grade 608 Chrome Carbide

- **Valve trim, centrifuge nozzles**
- **Pump seal rings**
- **Bearings and bushings**
- **Food and chemical processing equipment**
- **Shear blades for molten glass**
- **Core pins for ceramic baking**
- **Textile guides, and many other parts where corrosion, abrasion and erosion must be resisted**

GET A "TRY-IT-YOURSELF" CHROME CARBIDE KIT

Test Chrome Carbide yourself! Kit includes: 3 bars $\frac{1}{4}$" sq. x 2"; 2 bars $\frac{1}{2}$" sq. x 1"; 3 bushings 5/16" I.D.; 1 rod $\frac{1}{8}$" dia. x 1" long. Price of kit is $10.75 (subject to applicable sales and use taxes). Kit is adequate for conducting a wide variety of tests in your laboratory.

Carboloy Department of General Electric Company
11181 E. 8 Mile Ave., Detroit 32, Michigan

☐ Send me Chrome Carbide Technical Report CC-100 free of charge.
☐ Send me____ "Try-It-Yourself Kits" of Chrome Carbide at $10.75 each (subject to applicable sales and use taxes).
Enclosed is: ☐ Check ☐ Money Order ☐ Purchase Order

Name _____ Position _____
Company _____
Address _____
City _____ Zone ____ State _____

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY

"Carboloy" is the trademark for the products of the Carboloy Department of General Electric Company

354

Lane-Wells packers to meet your requirements

"I knew they'd always have the answer for my jobs—but I was surprised when I got to checking the Lane-Wells catalog.

"Valve packers and valveless packers; hookwall packers and sit-down packers; packers for cased hole and packers for open hole; packers for testing and for production; casing-to-casing and tubing-to-casing packers; even an 'upside-down' packer for use where pressures below the packer are very high.

"Matter of fact, I got curious, and counted 'em. And, do you know, I found that Lane-Wells has 354 different sizes and types of packers! No wonder they can handle packer jobs quickly and efficiently."

Tomorrow's Tools—Today!

LANE-WELLS COMPANY

General Offices, Export Office, Plant • 5610 So. Soto St., Los Angeles 58

LOS ANGELES • HOUSTON • OKLAHOMA CITY • LANE-WELLS CANADIAN CO. IN CANADA • PETRO-TECH SERVICE CO. IN VENEZUELA

AP-608

Are we going up or down?

Sometimes you can't be sure in a helicopter without referring to the instruments. Nor can you always be sure of your exact position in the gasoline market without checking all your "reference points." Your own sales figures are only half the picture. You have to know how the whole market is doing to really see where you are going.

Years ago, Ethyl realized that what the industry needed was a monthly report of gasoline sales in each area. Then each oil company could plot its own sales against the trend.

So in 1931 we set up a system for gathering and reporting this information—keeping each company's sales in strict confidence—but releasing the important over-all figures.

(Continued on next page)

Printed in U.S.A.

Are we going up or down?

(Continued from preceding page)

The market report your company gets is called the "Ethyl Monthly Report of Gasoline Sales." It shows sales of regular and premium gasoline for each state and the percentage of change from the same period of the previous year. Information as to aviation gasoline sales is tabulated separately.

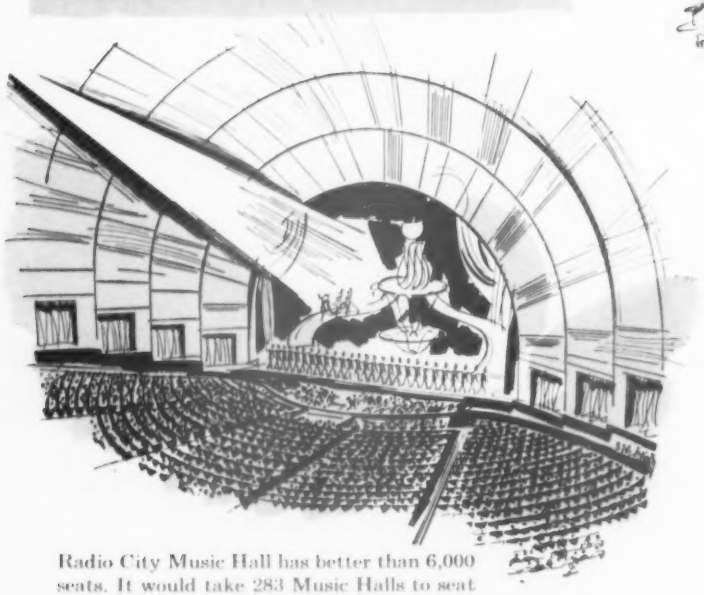
The report covers 97% of all gasoline sold in the United States, and it's tailor-made for gasoline marketers — it excludes naphthas, diesel and jet fuels, and is based on actual sales figures.

These monthly gasoline reports are an exclusive Ethyl service, which we're proud to perform for the petroleum industry.

ETHYL CORPORATION

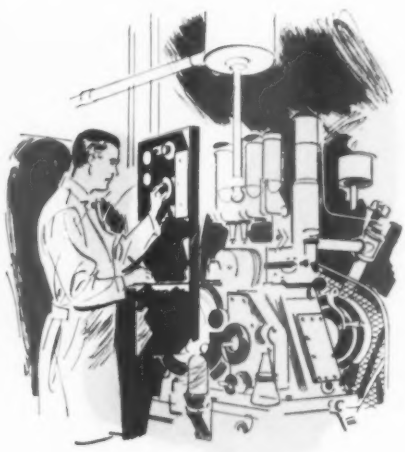
NEW YORK 17, NEW YORK

WORTH NOTING



Radio City Music Hall has better than 6,000 seats. It would take 283 Music Halls to seat all the people who saw Ethyl's educational films last year.

There were approximately one million tractors on farms in 1935 when the first high compression tractor—which Ethyl helped develop—was placed on the market. Today there are more than 4 times as many tractors! And this market alone accounts for some 3½ billion gallons of gasoline annually.



More than 15,000 gasoline samples are tested at Ethyl's five gasoline testing laboratories each year to furnish refiners with accurate gasoline quality reports.

Ethyl Service is backed by 30 years of antiknock experience

You're sitting on top of the world in the AUTOCAR V/8

The new Autocar V/8 is giving truckers a new outlook on profitable transportation. The smooth performance of its great 200 horsepower engine steps up hauling schedules as much as 25 percent. There's nothing to touch it for making light of heavy loads. You should read the booklet on why the V/8 idea has every trucker talking. Send in the coupon for your copy.

AUTOCAR TRUCKS

THE WHITE MOTOR COMPANY
AUTOCAR DIVISION, ARDMORE, PA.

Factory Branches and Distributors from Coast to Coast in the U.S. and Canada

Export: Drexel Building, Philadelphia 6, Pa., U.S.A.

The White Motor Company
Autocar Division, Ardmore, Pa.
Please send me the Autocar V-8 Booklet

Name_____

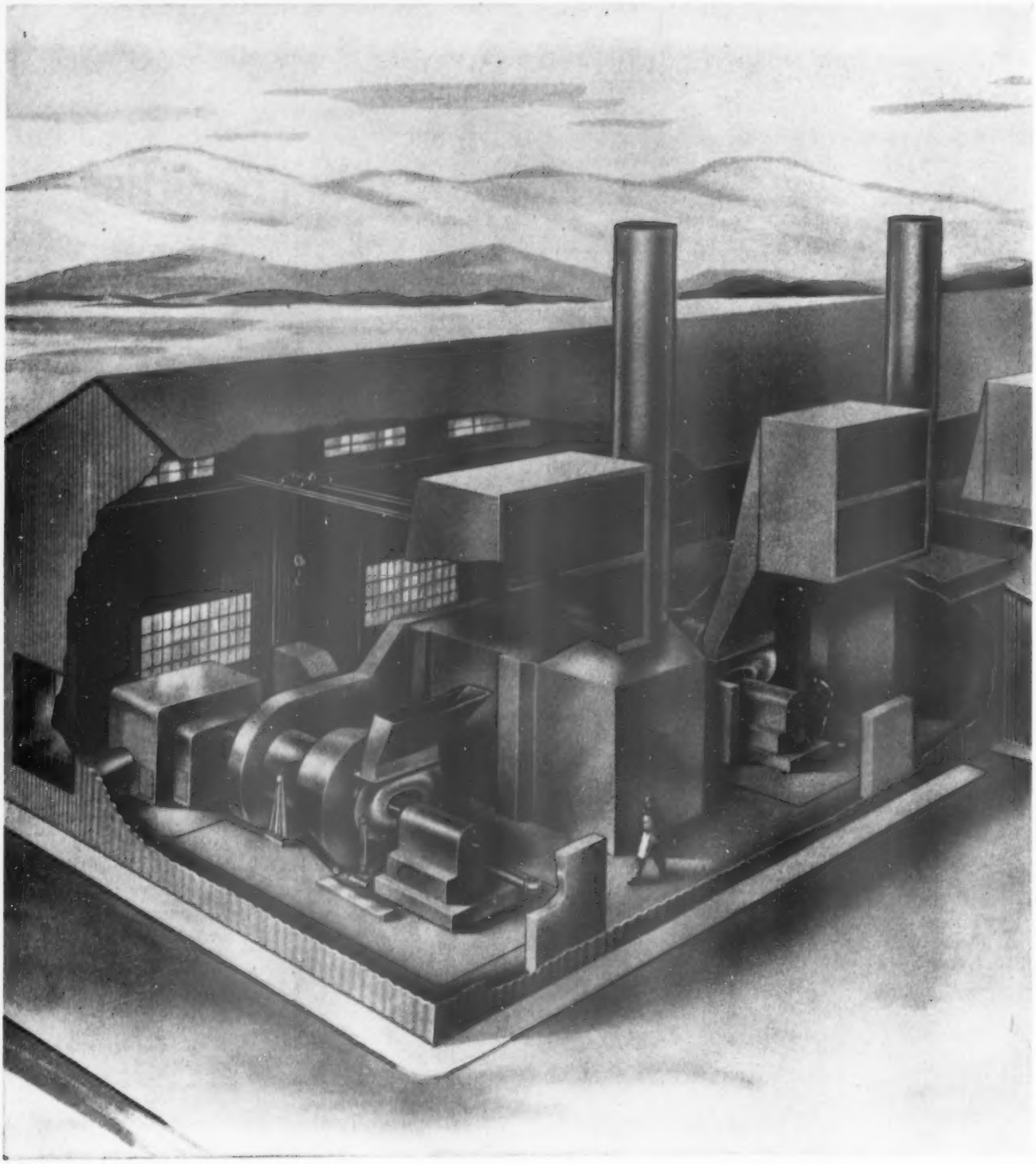
Company name_____

Address_____

Number of trucks in fleet_____

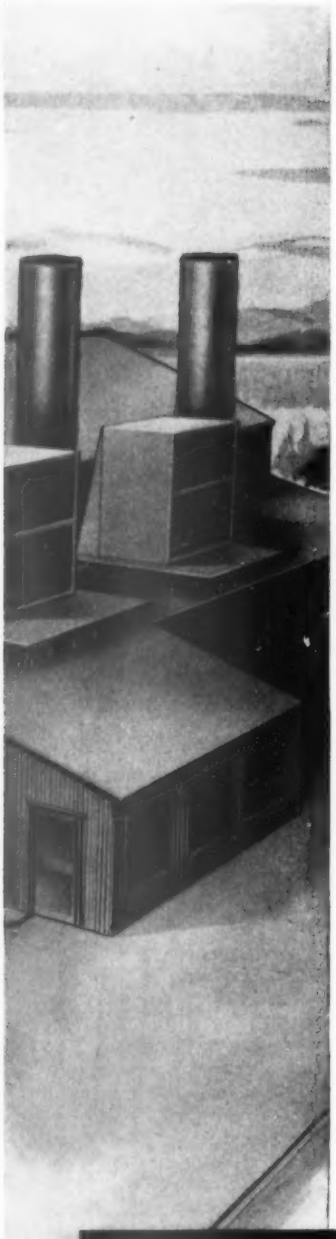
Type of operation_____

19K



This is a suggested Westinghouse 20,000-hp Compressor Station. The four centrifugal compressors are driven by 5000-hp gas turbines, equipped with air-filter washers, to lower inlet air temperature.

POWER PLANTS FOR PIPELINES



For Natural Gas Transmission . . .

Westinghouse 5000-hp Gas Turbines can deliver 25% extra horsepower

Compressor station power can be increased up to 25%—to give extra capacity when it's needed most—during winter operations. Westinghouse Gas Turbines can do this with their inherent ability to greatly increase output as ambient temperatures drop. This important gas turbine advantage reduces the need for extra equipment or oversize power plants to meet cold weather demand because air temperatures are normally well below the rated 80°F inlet temperature at these times. Ten percent increase in power is available for each 20°F below 80°F standard, up to 25% maximum.

As shown in the typical compressor station, at left, evaporative-type inlet air-filter washers—needing only small amounts of water—can be used to maintain capacity in hot weather with low relative humidity. Also, this combination reduces maintenance by removing air impurities.

This flexible bonus horsepower is just one of the many advantages of Westinghouse Gas Turbines . . . and a basic reason why this power plant is rapidly being adopted for natural gas transmission. It is proved by the first Gas Turbine Compressor Station to burn natural gas and drive centrifugal compressors—a Westinghouse installation which has now operated over 13,000 hours on the line.

Call Westinghouse now for more information on exclusive economies available with gas turbines. You can rely on over 50 years of Westinghouse advanced power plant experience to recommend and produce the most efficient gas turbine for your operation. J-50558

YOU CAN BE SURE...IF IT'S Westinghouse

NEW BOOKLET ON GAS TURBINE POWER PLANTS—Use the attached coupon to obtain this new gas turbine power plant planning guide for mechanical drive applications. This booklet contains performance, weights, and dimensions of a wide range of gas turbines that will fit your conditions. It will pay you to send for it right away.

Westinghouse Electric Corporation
P. O. Box 868, Pittsburgh 30, Pa.

Please send me "Westinghouse Combustion Gas Turbine Power Plants for Mechanical Drive Applications."
Booklet B-5859

NAME_____ TITLE_____

FIRM_____

STREET_____

CITY_____ ZONE_____ STATE_____

Better Service for Phenol Users as Monsanto Builds Second Plant

West Coast users of Monsanto phenol will be assured of fast deliveries from a new phenol plant now nearing completion at Avon, California. The Avon plant will be Monsanto's second phenol-producing unit. It has been built to offer *direct* service to phenol users from a producing unit in their locality, rather than deliveries from bulk stations or rail sidings.

Monsanto is the only manufacturer with two widely separated phenol plants. This means faster deliveries to *all* Monsanto customers. Write now for price quotations and delivery information to MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 800 North Twelfth Blvd., St. Louis 1, Mo.

A copy of this booklet, "Handling of Phenol," will be sent on request. Ask for extra copies for your plant men.

MONSANTO
CHEMICALS for PLASTICS

SERVING INDUSTRY... WHICH SERVES MANKIND

They Say—

That Slippery Place Is Still There

Chicago Daily News carton by Jensen.

New Tidelands Suit . . .

. . . Sensible?

"Alabama's suit against the offshore-oil law shows how completely false was the original argument in favor of that act——that it would 'quiet' the title of the states. Never has the clamor been more extreme.

"Missouri is preparing to bring suit. Texas and Louisiana are embroiled in a dispute over their offshore boundaries.

"Congress has got itself into this mess, and the strong indications are that it will have to depend on the Supreme Court to get it out. A decision reaffirming what the high court said in the California and Texas cases —that nobody owns the ocean, but that dominion over these marginal seas is an adjunct of national sovereignty— offers the only visible hope of quieting the inevitable discord at last."

From an editorial in the St. Louis Post-Dispatch.

. . . or Foolish?

"What won't they think of next! Now Alabama challenges the return of our tidelands by Congress on the grounds that Texas might ask Alabama fishermen to pay a fishing license while operating in the historic boundaries of our state.

"The same fear is expressed as to Louisiana, Florida, and California, if they, too, are allowed to keep their own tidelands.

"The Alabama suit . . . is a direct

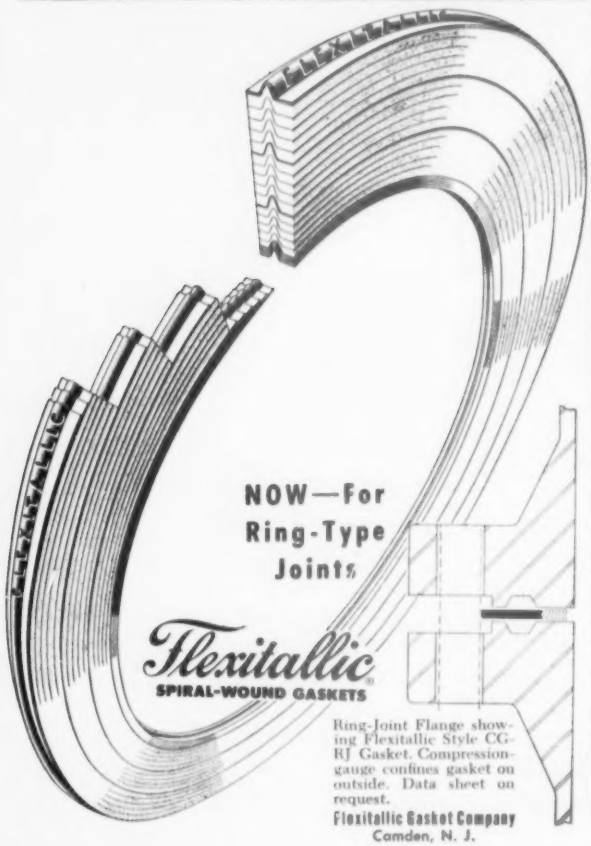
SERVICE FOUNDRY

IRON, STEEL, NON-FERROUS CASTING, GEAR CUTTING, MACHINE WORK

top quality metallurgical control— expert workmanship throughout, from office force to delivery, has made our name what it is today!

SERVICE FOUNDRY — a division of **AVONDALE MARINE WAYS, Inc.**

416 Erato Street, New Orleans, U. S. A. P. O. Box 1030, New Orleans, U. S. A.



NOW—For Ring-Type Joints

Flexitallic
SPIRAL-WOUND GASKETS

Ring-Joint Flange showing Flexitallic Style CG-RJ Gasket. Compression-gauge confines gasket on outside. Data sheet on request.

Flexitallic Gasket Company
Camden, N. J.

JENSEN . . . the Pumping Unit YOU helped to Design!

It's true that Jensen has made Pumping Units for more than 33 years—but not alone! Our engineers have worked hand-in-hand with YOU—oil men everywhere—getting first-hand information concerning your problems and how best to solve them. This close relationship has resulted in dependable JENSEN Pumping Units that lift MORE oil at LESS cost.

Investigate JENSEN Units—we believe you'll agree that they are designed to meet your specific requirements for production and economy. Write us at Coffeyville, or see your nearest Jensen Dealer.

JENSEN

BROS. MFG. CO., INC., Coffeyville, Kansas
EXPORT OFFICE: 50 Church St., New York City

appeal to the United States Supreme Court. It is the second thus far lodged against the constitutionality of the act passed by Congress and signed by President Eisenhower. It alleges that quit-claim act is an 'unlawful abdication' of federal sovereignty.

"The first attack was launched several weeks ago by . . . Arkansas. The Arkansans pitched their main argument on the possibility that as much as $50,000,000,000 in oil other resources were to be found in the tidelands. These resources, it was decided in Little Rock, belong to all the states of the Union.

"The Alabamans used the Arkansas argument, but added the fishing license angle, which actually takes up the larger amount of space in their brief. Alabama, it is said, has a 'large interest' in the fish, shrimp, crabs, lobsters, and other sea life in the affected waters."

From an editorial in the Dallas Morning News.

Product Prices Still Low

"If yours is a typical family, about 2½ cents out of every dollar you spend goes for gasoline and oil. The average car consumes nearly 2 gal. of gasoline a day. Out of our national consumption of oil products, 43 per cent is in the form of motor fuel. Every minute of the day, America's 53 million motor vehicles travel a total of more than a million miles.

"But a barometer—even one's pocketbook—is not always easy to read. So choppy have been the seas of inflations, so complex the other economic weather brewing at the same time, that few people are aware of a simple fact: gasoline today, in terms of the individual's average earnings, is far cheaper than it was 10 years ago, or at the depths of the Great Depression, or at any time during the prosperous '20's.

"And this fact holds true despite the price change of last June when, in a much delayed reaction to strong demand and increased costs, gasoline prices edged upward about 4 per cent or—at retail—from 1 to 1½ cents a gallon."

From an article in the Humble Oil & Refining Co. publication, The Humble Way.

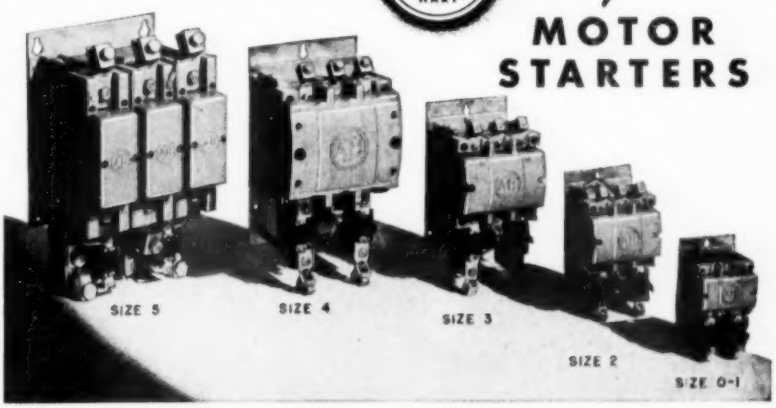
Gas Industry Needs Fair Shake

"The days when gas was considered a nuisance are gone forever. Natural gas has come of age. It is a valuable product in its own right. Since the industry has now reached maturity, it must stand on its feet and carry its

DESIGNED *Specifically* FOR YOUR NEEDS

A COMPLETE LINE SIZES 0 thru 5

TYPE "RA-V" ARROW AH HART *Magnetic* MOTOR STARTERS



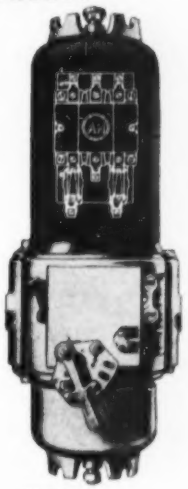
WITH VERTICAL OVERLOADS BELOW THE CONTACTOR

for use with TYPE EPC EXPLOSION-PROOF CONDULETS

FEATURING—

- **STRAIGHT-THRU WIRING** . . . This original Arrow-Hart feature means space, time and work savings up to 30%. Looping and U-bending are eliminated; circuit identification is immediate and positive.
- **RUGGED CONTACTS** . . . Special silver alloy tips withstand severe punishment. Vertical operating position prevents accumulation of breakdown material.

. . . and incorporating the exclusive **"RA" OPERATING MECHANISM** . . . that makes it possible to combine greatly reduced starter size and weight with superior performance and added dependability. This means smaller, lighter, less expensive installations.



SIZE 2
"RA-V" STARTER
7" TYPE
EPC CONDULET

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L. F. McCollum, president of Continental Oil Co., addressing the annual convention of the Independent Natural Gas Association of America.

CALENDAR OF EVENTS

OCTOBER

12-16 Short course on cathodic protection, University of Illinois, Urbana.

16-18 New Mexico Geological Society, fourth annual field conference, El Paso, Tex.

19-21 American Institute of Mining and Metallurgical Engineers, petroleum branch, fall meeting, Dallas.

19-20 Independent Petroleum Association of America, annual meeting, Texas Hotel, Fort Worth.

19-23 National Safety Congress, annual meeting, Hotels Conrad Hilton, Congress, Harrison, and Sheraton, Chicago.

21-23 Gulf Coast Association of Geological Societies, third annual convention, Captain Shreve Hotel, Shreveport.

22 American Institute of Chemical Engineers, New York section, symposium, Hotel New Yorker, New York.

22-23 Western Petroleum Refiners Association, regional meeting, Garrett Hotel, El Dorado, Ark.

23 Natural Gasoline Association of America, regional meeting, Blackstone Hotel, Tyler, Tex.

26-28 National Lubricating Grease Institute, Edgewater Beach Hotel, Chicago.

26-29 American Gas Association, annual conference, Kiel Auditorium, St. Louis.

27 Institute of Gas Technology, annual meeting, Chase Hotel, St. Louis.

27 Association of Consulting Chemists and Chemical Engineers, Inc., annual

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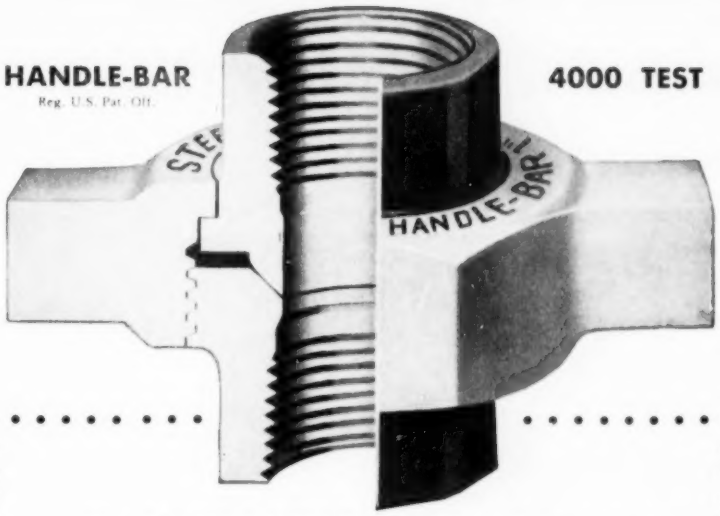

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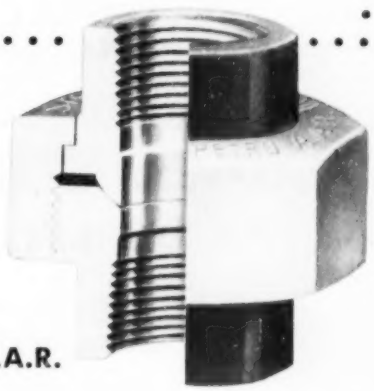

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meeting, Hotel Belmont Plaza, New York City.

28-30 Seventeenth Technical Conference on Petroleum Production, Mineral Industries Building, Pennsylvania State College, State College, Pa.

29-31 Rocky Mountain Oil and Gas Association, annual convention, Cosmopolitan Hotel, Denver.

30-31 South Texas Geological Society, annual fall field trip, San Antonio.

NOVEMBER

3- 4 Society of Automotive Engineers, national diesel-engine meeting, Conrad Hilton Hotel, Chicago.

5- 6 Society of Automotive Engineers, national fuels and lubricants meeting, Conrad Hilton Hotel, Chicago.

5-6 American Association of Petroleum Geologists, Pacific section, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists annual joint meeting, Hotel Biltmore, Los Angeles.

6- 7 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.

9-11 Geological Society of America, annual meeting, Royal York Hotel, Toronto, Ont.

9-12 American Petroleum Institute, annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

12-13 Society of Exploration Geophysicists, midwestern meeting, Adolphus Hotel, Dallas.

19-20 National Association of Corrosion Engineers, western region, fall conference, Biltmore Hotel, Los Angeles.

19-20 Annual Instrument Short Course, Los Angeles Harbor Junior College, applied technology division, Wilmington, Calif.

20 Natural Gasoline Association of America, regional meeting, Herring Hotel, Amarillo, Tex.

Nov. 29-
Dec. 2 American Society of Mechanical Engineers, Statler Hotel, New York City.

DECEMBER

1- 4 Corrosion conference, University of Oklahoma, Norman.

13-16 American Institute of Chemical Engineers, annual meeting, Hotel Jefferson, St. Louis.

JANUARY

11-15 Society of Automotive Engineers, annual meeting and engineering display, Sheraton-Cadillac and Statler Hotels.

12-14 National Constructors Association, annual meeting, Hotel Commodore, New York City.

FEBRUARY

26 Natural Gasoline Association of America, Permian Basin regional meeting, Lincoln Hotel, Odessa, Tex.

MARCH

1- 5 American Society for Testing Materials, spring meeting, Shoreham Hotel, Washington, D. C.

3- 5 American Petroleum Institute, Division of Production, Southwestern district, Rice Hotel, Houston.

4- 5 American Gas Association, transmission and storage conference, Jung Hotel, New Orleans.

8-10 American Institute of Chemical Engineers, Statler Hotel, Washington.

17-19 American Petroleum Institute, Division of Production, Mid-Continent district, Skirvin Hotel, Oklahoma City.

Fire Fighters Approaching Blazing Oil Tanker — armed with Rockwood equipment.

Navy uses foam to put out fire

160,000 barrels of high octane gasoline aboard the tanker above were ignited when it collided with another tanker in the Delaware River.

The picture shows a Navy fire-fighting team approaching the blaze from the tug USS Toka. To cool the decks before boarding the tanker, they are using: a 2½" Rockwood In-Line Eductor through which Rockwood FOAM is introduced — a 2½" FFF Rockwood FogFOAM Nozzle with FOAM Shaper for discharging a solid straight FOAM stream — and 2½" and 1½" Rockwood WaterFOG Nozzles through which a straight water stream is being discharged.

Under the direction of Lt. Comdr. Louis O. Lindeman, the 10-man Navy team boarded the ship, pumped FOAM into tanks below the decks and put out the blaze in 6 hours. *Almost 92% of the gasoline cargo was saved!*

This dramatic example of the effectiveness of Rockwood equipment in action is typical of Rockwood's ability to engineer water to cut fire losses.

ROCKWOOD SPRINKLER COMPANY

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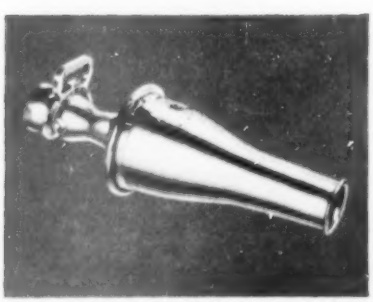
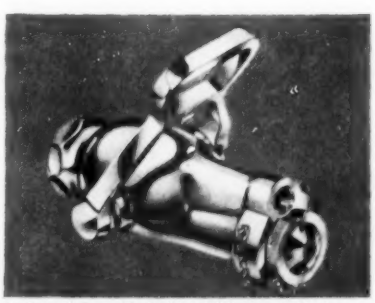


Rockwood Type FFF FogFOAM Nozzle with Foam Shaper discharges long, solid FOAM stream. The 2½" size FOAM stream is approximately 60 feet. Discharges 200 g.p.m. @ 100 psi.



Rockwood Type SG-48 WaterFOG Nozzle discharges high velocity WaterFOG, straight water stream or low velocity WaterFOG from extension applicator. For ¾", 1", 1½" and 2½" fire hose lines.

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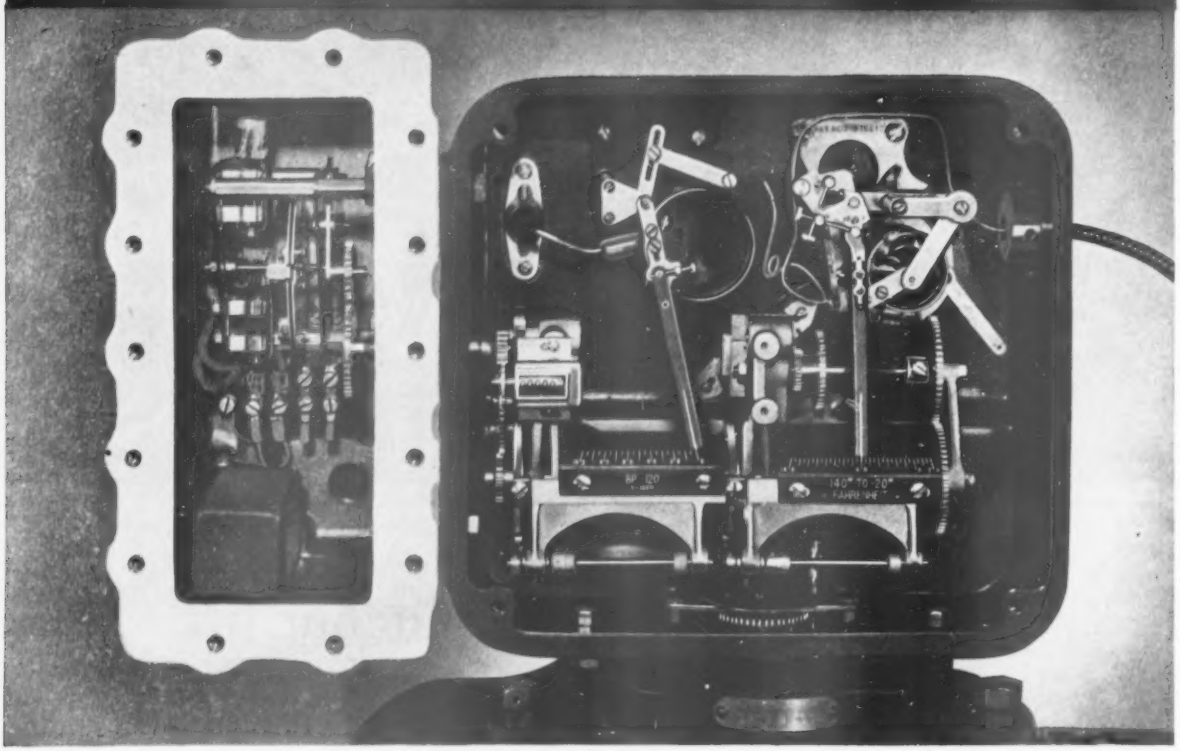

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TULSA, OKLAHOMA

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JOURNALLY Speaking

Shoot from the Hip

STILL on the theme of the oil industry's public relations, every so often somebody suggests to us that we take a crack at the industry in general or some segment of it for missing the boat on public relations.

Usually this alleged shortcoming concerns the failure to make an answer to some unwarranted charge or blast against the industry, such as in a court case, a development in Congress or a state legislature, or perhaps in a municipality troubled by smog which somebody wrongly blames on refineries. Of if a defense is issued at all it may be too late or too colorless to get much of a play in the newspapers.

It's not our job to lecture the oil industry on public relations nor to point with shame to any failures or omissions, but we are inclined to agree with the industry's critics—most of whom are within the industry itself—that a great many executives could well learn to be a bit more nimble and aggressive in springing to the defense and telling the public their side of the case. All the hoopla of Oil Progress Week won't entirely overcome a "bad press" the rest of the year.

Other Weeks

THIS is Oil Progress Week, when the oil industry puts on its best bib and tucker and leans over backwards being nice to everybody.

This is the week when the whole industry goes all out for public relations, employe relations, customer relations, press relations, government relations, internal relations, external relations, and poor relations.

There is nothing at all wrong with Oil Progress Week except that some people may get the idea that all these kinds of relations belong in only a single week out of the year and can be ignored the other 51 weeks.

Actually, of course, being a good neighbor and getting people to understand you and appreciate you is a year-'round job. Whether or not people have a right to know what oil companies are doing is virtually an academic question these days, because people think they have that right and are determined to exercise it. But many oil men have been keeping things to themselves for so long that it is hard to break the habit.

One excellent device for overcoming this is a public-relations manual, such as the one Texas Eastern Transmission Co. issues to its employes. It contains a brief history and description of the company, outlines its public-relations policy and procedure, and gives general instructions on such things as station tours, public speeches, and participation in community activities.

One of the most important chapters tells how to deal with newspaper reporters and photographers, particularly in cases of accident or emergency. Employes are told never to brush off a reporter but to take him immediately to an official with authority to talk, help him get all the facts straight, give him access to a telephone, and cooperate in other ways.

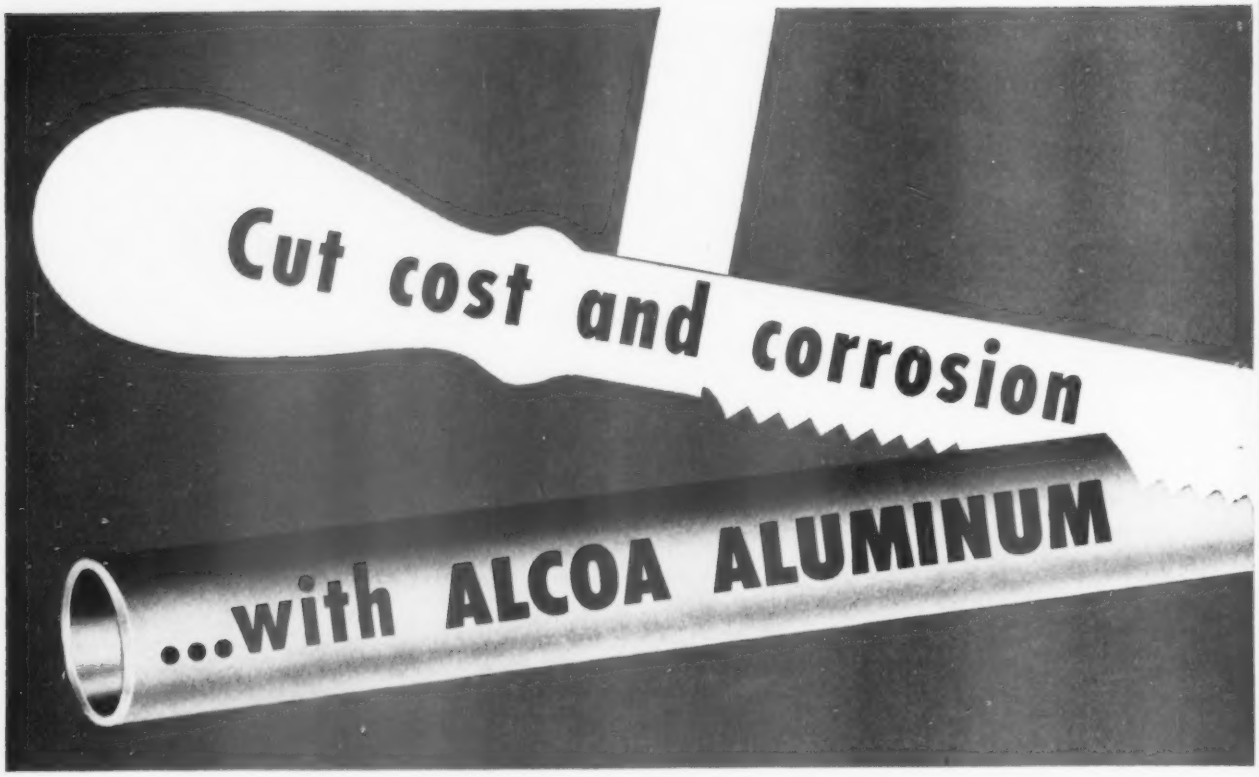
Cold Bet

IF oil men weren't inherent gamblers we wouldn't have much oil, and if they didn't keep their promises promptly and to the letter we wouldn't have much of an oil industry.

This carries through into the little things, too. For example, the secretary to a Tulsa oil man recently performed a little chore which would be out of the ordinary in most industries but was no more unorthodox than a great many things that happen in the oil business. She went to a drug store, ordered a malted milk "to take out," had it packed in a big carton of dry ice, and turned it over to an express company with instructions to deliver it to another oil man in the western part of the state.

Her boss had lost a bet of a malted milk over whether a well would or would not come in, and wasted no time squaring his obligation.

—*Henry D. Ralph.*



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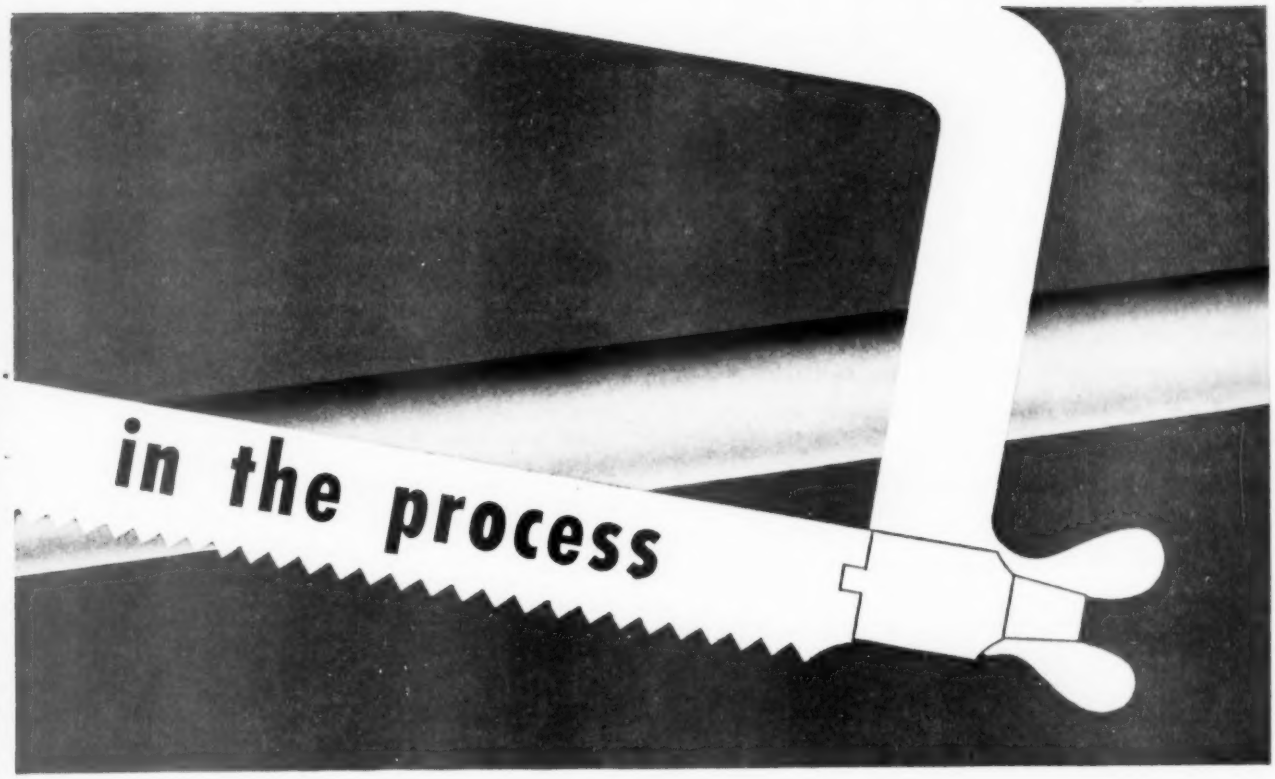

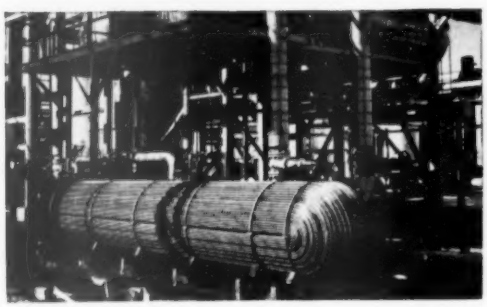

Griscom-Russel Re-boiler at El Paso Natural Gas Company, Farmington, New Mexico.

Got corrosion troubles?

So did El Paso Natural Gas Company's desulfurization plant near Kirtland, New Mexico, world's largest gas treating plant. Alloy steel tubing could not withstand the terrific acid conditions there. Result: *to minimize this trouble, condenser and heat exchanger tubing throughout the plant is being replaced by aluminum.*

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IT'S SIMPLE, SPEEDY AND SAFE to perform two-stage cement jobs with Baker Stage Cementing Collars (Product No. 200-F) in combination with other Baker Equipment. In addition to positive, mechanical closing of the cementing ports upon completion of the second stage, you are assured of these outstanding advantages:

1. After the second stage has been completed, an external steel sleeve with an oil-resistant synthetic rubber seal provides positive closure and prevents passage of fluid between the inside and the outside of the casing, regardless of the condition of the cement job at that point.

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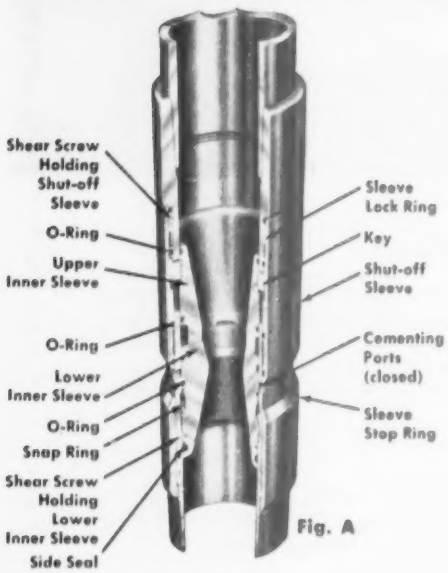

Fig. A

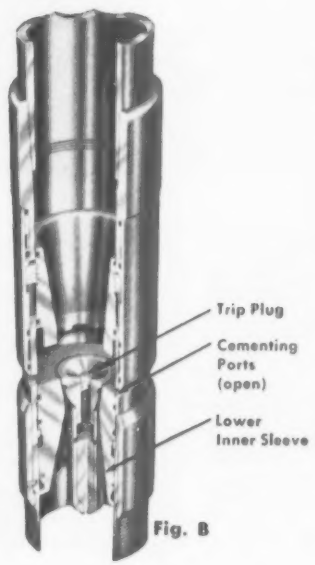

Fig. B

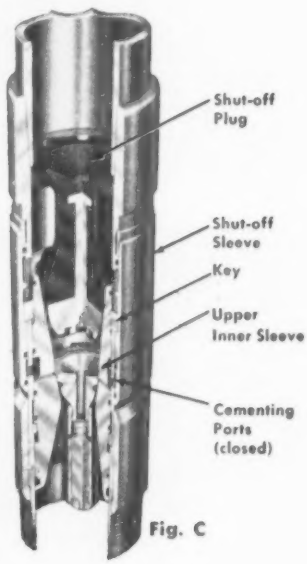

Fig. C

Fig. A—Ready for cementing the first stage. The cementing ports are covered by the Lower Inner Sleeve which is held in position by shear screws; shear screws also hold the Shut-Off Sleeve above the cementing ports.

FIG. B—Ready for cementing the second stage. After the Trip Plug is seated, application of hydraulic pressure shears the screws holding the Lower Inner Sleeve which moves downward, thus uncovering the cementing ports. The Trip Plug prevents passage of fluid into the casing below, and cement pumped into the casing will now pass through the cementing ports for the second-stage cementation.

FIG. C—Second-stage cementation is completed. The Shut-Off Plug has been pumped down the casing and pressure applied to shear the screws and move the Shut-Off Sleeve downward to close off the cementing ports. Note how the Sleeve Lock Ring has expanded to lock the Shut-Off Sleeve in position permanently covering the cementing ports.

2. The cementing ports of the Stage Cementing Collar may be opened at any time after completion of the first stage, and fluid may be circulated through the stage collar for any desired length of time before starting second-stage cementing.
3. Operation of the stage collar is effected by fluid pressure applications only, and no movement of the casing is required after the first stage of the cementation has been completed.
4. All internal parts of the Baker Stage Cementing Collar are constructed of readily drillable materials, and when drilled out there are no sharp shoulders or irregularities to interfere with the subsequent passage of tools through the collar.
5. Since the steel Shut-off Sleeve is on the outside of the Stage Cementing Collar, there is no possibility of accidentally opening the cementing ports when drilling out the internal mechanism, or later when bits or casing scrapers are run through the collar.

Ask any Baker representative or office for recommendations to make your stage cementing operations successful, "first-time" accomplishments.

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We still don't know the meaning of conservation

CONSERVATION, the theme of the current Oil Progress Week, has had a wide range of meanings in the petroleum industry, and still different interpretations may be accepted in the future.

Some 30 years ago the prevailing concept of conservation was to lock up known reserves and hold them static for future generations. There was considerable public sentiment for forcing this type of conservation on the oil industry, but fortunately the folly of the idea became apparent.

Then, under the spur of disastrous flush production, oil producers came to accept the theory that conservation means avoidance of physical waste. After many tortuous years of engineering and legal struggles the procedures for accomplishing this have been rather well established.

THEN came the idea that conservation means prevention of economic waste by tailoring production to market demand. This is good economics but dangerous politics. The mechanics of its application have not yet been perfected to the satisfaction of all of the industry nor all of the public.

At this moment the operations of the Interstate Oil Compact Commission and the conservation authorities of the various states are under severe political criticism and suspicion of price fixing. The charge is unfounded and the industry should act vigorously to clear its name with the public.

But the potentiality for price fixing does exist, and suspicion of abuse of this aspect of conservation will continue to arise until more obvious safeguards for consumers are incorporated into the administrative process.

IN recent years the guiding principle of much conservation administration has been maximum ultimate recovery, and to this end conservation has leaned heavily on technology. Herein lies a small danger.

The technology of reservoir control is in its infancy and changing rapidly, whereas regulatory psychology and procedure are prone to become static and inflexible. No two oil pools are exactly alike, and what may be conservation for one may be physical or economic waste for another. Also, unless the conservation bodies are better engineers than the witnesses they may be misled by scientific half-truths and inapplicable engineering hypotheses.

Conservation has made tremendous strides but it is still far from perfect in either concept or application. Continued progress requires imaginative thinking, receptive minds, and a judicious blending of technology, economics, and politics.

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These bars of neat cement were photographed after exposure to a 4% sodium sulphate solution. The two bars, at left, made with cement without special inbuilt properties of sulphate resistance, show disintegration after 30 days—while the 'Starcor' bar, at right, is unaffected. After five years' exposure in such tests, 'Starcor' specimens have remained in excellent condition.

Outstanding sulphate resistance, excellent pumpability under high temperatures and pressures, and dependable strengths explain the outstanding performance of 'Starcor'*—make it truly the Oil Man's Cement.

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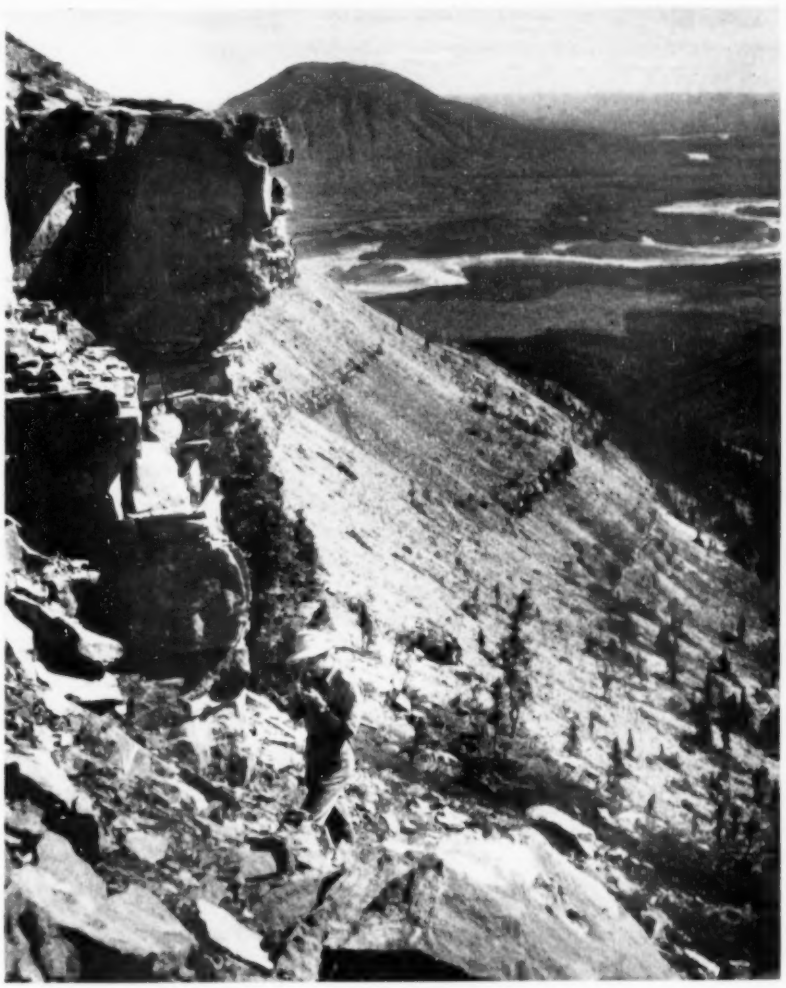
THIS WEEK... ...IN THE NEWS

EXPLORATION in western Canada is continuing at a high pitch. Expenditures last year for exploration and development came to more than $250,000,000, and it is expected that this figure will be equaled or exceeded this year. One of the active exploration areas is the Fort St. John-Peace River region of British Columbia and Alberta. This Imperial Oil, Ltd., geologist, a member of one of the many crews working the area, is studying an outcrop in the Nahanni Butte region.



TRENDS—Major product stocks increased only 83,000 bbl. daily for the 3-week period ended October 3 compared with 817,000 bbl. daily for preceding 3 weeks. . . . Refinery output of major products averaged 178,000 bbl. daily less for the past 3 weeks. . . . Total demand for all products increased about 10 per cent over the average for 3 weeks ended September 12. . . .

ACTIVITY—Production of crude and lease condensate averaged 6,411,875 bbl. daily for week ended October 3, down 46,975 bbl. daily. . . . Total well completions decreased 76 wells for the week to 969. . . . Wildcat completions dropped 51 wells to 170. . . . Rotary rigs operating in the United States increased 44 rigs for week ended October 5 to 2,679. . . .

INTERNATIONAL — Peron's government continues to consider inducements to foreign capital to bolster Argentina's lagging domestic oil production. . . . The government must make substantial changes in its present nationalistic oil policy before much United States money would be attracted to Argentina. . . . Shell abandoning its deep test in the Maracaibo basin after 5 months of fruitless testing. . . . The well, at 17,537 ft., is the deepest hole ever drilled outside the United States.

CORROSION—Corrosion engineers meeting in Tulsa note an increasingly serious problem in stray currents from corrosion control rectifiers damaging other underground structures. . . . Smaller rectifiers, insulating flanges and sacrificial anodes are suggested as partial solutions, but careful placement of rectifiers is called the most certain safeguard. . . . External cathodic protection is called the most economical answer to imperfections in pipe coating.

DRILLING—Ohio Oil Co. passes 4-mile mark, continues drilling below 21,136 ft. . . . Rank wildcat in Florida recovers 2,185 ft. of oil on drill-stem test, indicating second commercial field for the state. . . . World's deepest production indicated in deep Weeks Island test of Shell in Iberia Parish, Louisiana. . . . Hole bottomed at 18,568 ft. being tested in interval between 17,260 and 17,306 ft. . . . Contractors told they need to pay more attention to their finances. . . . A.A.O.D.C. meeting told by Dallas bank executive that sound financing is at least as important to success as drilling knowledge. . . . One-fifth of all wells drilled on the West Coast this year will be slanted holes, A.I.M.E. chapter told. . . .

PIPE LINES—American Louisiana Pipe Line Co. is preparing to submit an application to the Federal Power Commission for authority to build a 30-in. line from the Gulf Coast gas fields to serve Michigan and Wisconsin markets. . . Scheduled for completion in June 1956, the line is planned for an eventual 550,000 M.c.f. daily capacity. . . . Sunray Oil Corp. has a 50 per cent interest in the planned 472-mile pipe line of 10 and 12-in. diameter to transport products from Oklahoma refineries to the Mississippi River. . . . Contracts for the $20,000,000 line are expected to be let this month. . . .

PRODUCTION—Tide Water shuts in 600 producers in Kern River field near Bakersfield, Calif., with total output of 4,300 bbl. daily. . . .Action blamed on excessive stocks and believed to reflect only Tide Water's individual inventory situation.

BIG TRANS MOUNTAIN LINE, claimed by many to be the world's most-difficult pipe-line construction job, links oil fields in Alberta with the already booming Pacific Northwest refining area. Side-hill cuts on the project extended as far as a mile. Shortly after this photograph was taken in the Jasper, Alta., area, an avalanche buried the bulldozers and rooter under 10 ft. of rock.

FIRST BIG CRUDE LINE in Canada was the 1,127-mile Interprovincial line from Edmonton, Alta., to Superior, Wis., shown here under construction. This line was officially opened in October 1950. Lakehead Pipe Line Co.'s current 644-mile extension of the line from Superior to Sarnia, Ont., will rank this system as the longest continuous crude-oil trunk in the world.

New Lines Brighten Future

They mean a shift in the refining picture and a further increase production, now set at 235,000 bbl. daily

Paul Swain

CANADA, for years the oil industry's sleeping potential giant, shows increasing signs of a steady awakening from the slumber imposed by a lack of a readily accessible market for its production.

Completion of the Trans Mountain pipe line and the impending completion of Lakehead's link of the long Interprovincial line mark an important turning point in the history already recorded for the Canadian oil industry.

The Trans Mountain line means a major shift in crude movement and refining. The Lakehead project will do much to solve Canada's seasonal production problems and provide the eastern refining centers with Alberta crude the year round.

Together, they mean greater outlets for Canadian crude oil and a resulting big boost in production—now estimated at 235,000 bbl. daily for this year.

Completion of the Lakehead project in the next few months will jump production even more next year. The finish of this 644-mile line between Interprovincial's line at Superior, Wis., and Sarnia, Ont., will link Canadian oil with refinery outlets by the longest pipe line in the world.

The completed 24-in. Trans Mountain line from Edmonton to Vancouver and the Puget Sound area is already creating a new refining area on the Pacific Coast and will give Alberta crude still another outlet. This will slow the flow of products from south to north on the Pacific Coast. California will no longer be called upon to supply the entire northwest.

The refining centers which could handle western Canada's crude have always been concentrated in Ontario and Quebec and have operated largely on crude imported from South America. Planned refinery construction in the Pacific Northwest during the next 2 years will help balance refining capacity.

Capacity expanding... At present Canada has some 40 refineries, but 9 of them in Ontario and Quebec handle the bulk of the country's refining. Twenty plants in Alberta and Saskatchewan process only 120,000 bbl. of Canada's daily refining capacity of 493,000 bbl.

Plans were announced within the past year for the construction of facilities —new refineries or expansions at existing plants—that will establish a Puget Sound refining area capable of handling at least 125,000 bbl. of Alberta crude daily.

These new facilities include:

...**Shell Oil Co.** refinery at Anacortes, Wash., will have a capacity of 50,000 bbl. and will be the largest refinery in the Pacific Northwest.

...**General Petroleum Co.** has started construction on a new 35,000-bbl.-daily refinery at Ferndale, Wash.

...**Pacific Oil & Refining Co.** is building a 10,000-bbl. refinery at Seattle.

...**Royalite Oil Co., Ltd.,** has a 5,000-bbl. refinery under construction at Kamloops, near one of Trans Mountain's stations, that is expected to be completed by the end of 1954.

In addition to the new construction, the following expansion projects have been outlined:

...**Shell** is doubling the capacity of its 7,000-bbl. refinery at Shellburn.

...**Imperial Oil, Ltd.,** has just completed an expansion of its Ioco, B. C., refinery to 22,500 bbl. daily and added British Columbia's first catalytic cracker.

Across Canada at the already firmly established refining area of Sarnia, Sun

Oil Co. expects to complete a new 15,000-bbl. refinery in October.

Gains without fanfare . . . Thus, the productive capacity of Canada is loosing its fetters. Canada may in time compel the rest of the world to assume the optimistic view of her oil future that many Canadians now hold. She may force an industry with an eye on the future to take another look at her recent past.

Oil discoveries were first made in Canada years ago, but it took the discovery of Devonian production at Leduc, Alberta, in February 1947 by Imperial Oil, Ltd., to start an enlarged and intensive exploration program. The following year Redwater field was discovered and in a short time it had all but eclipsed the earlier field. Today, the two fields account for the lion's share of Canada's production.

Development of these two large producing fields highlighted the exploration that saw the number of wildcats in Canada double from 1948 to 1949, and the drilling has gone on since that time.

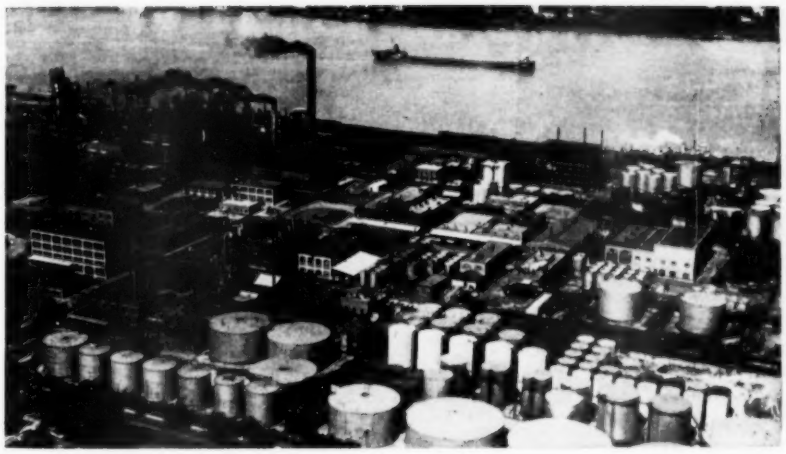
Somewhere between the overdose of optimism and oil fever that has gripped most Canadians and the extreme caution with which many U. S. oil men view their neighbor to the north, lies the true place for Canada in the world's oil picture.

That American caution has been bolstered by the fact that there hasn't been a major oil strike—by U. S. standards—in Canada since Golden Spike in 1949. But the discovery of many lesser pools has continued to swell Canada's reserves and her production capacity with every passing year.

The 900,000 sq. miles of the western Canadian basin indicate geologically that natural conditions at one time were as favorable for the accumulation of oil as any single area in the world. The basin is larger than the five largest oil producing states in the United States, and the entire basin is regarded as potentially productive.

Alberta, Saskatchewan and Manitoba are the heart of the region, but they are so remote they have a population 30 per cent less than the Rocky Mountain region of the U. S.—which contains only 3 per cent of the American population. This population scarcity only serves to accentuate the problem of a ready market for the production potential disclosed by oil discoveries.

In view of these obstacles, the increase in Canada's production has been little short of phenomenal. In the 10 years between 1942 and 1951, the number of operating wells in Canada more than doubled and the country's over-all production increased from little more than 10,000,000 bbl. in 1942 to almost 48,000,000 bbl. in 1951.



BIGGEST REFINERY IN CANADA is this 58,000 bbl. plant of Imperial Oil, Ltd., at Sarnia, Ont., in the eastern refining area. Completion of the Lakehead extension will permit year-around processing of Alberta crude in the many refineries in this area, lessening their dependence on crude supplies from South America and elsewhere.

In that 10-year period the gross value of Canada's production increased more than $100,000,000. Since 1951, another $100,000,000 has been added to the gross value of the annual production.

For the past 5 years Canadian production has jumped an average of 52 per cent a year. In 1952, the increase was roughly 29 per cent and 1953 promises to show an even larger one.

The 1952 production was more than 61,000,000 bbl., with Alberta supplying nearly 59,000,000 bbl. of the total. Production during the first 4 months of 1953 indicates Canada will probably produce about 86,000,000 bbl. by the end of the year and the estimate might be conservative in view of completion of Trans Mountain Pipe Line Co.'s 24-in. line to Vancouver.

The 235,000 bbl. daily estimated production for 1953 moves Canada ever closer to meeting her own domestic demand of a little more than 400,000 bbl. daily.

Athabasca sands . . . Aside from the recognized and more conventional oil reserves known to lie in the massive sedimentary basin of western Canada, the Athabasca tar sands, extending for more than 100 miles along the river of the same name, are believed to contain from 100 to 300 billion barrels of oil.

Presently known processes for separating the oil from the Athabasca sands have not been generally regarded as economic, but a recently organized company of American and Canadian interests has announced the development of a new centrifugal method of separation.

The announcement of the new patented process serves only to point up previous predictions that commercial production from the sands is not only possible but very probable within the next 5 to 10 years.

Pipe lines . . . Interprovincial's line from Edmonton to Superior, Wis., was completed in 1950 at a cost of $90 million. Soon it will be linked directly to the Sarnia refineries by Lakehead Pipe Line Co.'s 644-mile line to make it a total of 1,765 miles of continuous crude-oil main line and the longest in the world.

Lakehead's crossing of the stormy Straits of Mackinac with two 20-in. lines is easily the most spectacular pipe-lining feat in recent years. Bridging the straits was the toughest single job in linking Sarnia and Alberta, which will solve the seasonal production problems that have dogged Canadian oil. The icing of the Great Lakes bars tanker travel to refinery centers during the winter months.

The complete Trans Mountain line of 711 miles of 24-in. pipe from Edmonton to Vancouver and the Puget Sound area gives Canada's oil its gateway to the west.

Natural gas . . . The discovery of natural gas in Canada dates back more than 70 years, but commercial development of Canadian gas on a large scale is a comparatively recent thing. for the most part, Canada's gas discoveries have been incidental to the search for oil. Even so, Alberta alone has proved gas reserves of an estimated 18 trillion cubic feet and the extent of

LAKE TANKERS like the Imperial Leduc will lose their supreme importance to Alberta's oil production when the Lakehead line is completed. The pipe line will solve, for a large part, the stoppage in tanker travel during the winter months when lake icing halts traffic and the flow of crude to refineries.

these "accidental" gas discoveries make the industry an important economic factor for Canada.

As in the case of oil, however, Canada's natural gas has been shackeled by its remote location and lack of a ready large-scale market for production. It has been only recently that the government of Alberta removed still another barrier to the economic life of the gas industry. Alberta has finally indicated a willingness to discuss exportation of gas after assurances that the province has established a 50-year reserve for domestic consumption.

Now Alberta's government may be in the position of having tarried too long. The provincial government professes to be unconcerned about proposals of the United States to export more gas to Canada, but Alberta this month will consider two proposals for pipe lines to export gas to eastern Canada.

The U. S. Federal Power Commission last month granted permission for the export of 62,000,000 cu. ft. daily of U. S. natural gas to serve the Toronto market. The federal Government of Canada has not yet approved the project.

The Alberta government insists the amount of gas involved is too small to cause concern to the province's gas producers, but almost immediately after the FPC action, Alberta's Petroleum and Natural Gas Conservation Board stepped up the speed of its slowly moving machinery for the consideration of gas exporting licenses. The board, which has been hearing applications for natural-gas pipe lines since June, brought matters to a head last month in what appears to be a desperate effort to keep the populous areas of Toronto, Montreal, and Ottawa from slipping away from Alberta gas.

The board asked attorneys for two pipe-line companies to submit written arguments on their respective applications by October 17. The two companies are Trans-Canada Pipe Lines, Ltd., and Western Pipe Lines, Ltd. Trans-Canada has plans for an 1,800-mile "all Canada" line through the rough and rugged country of Manitoba, around the hump of Lake Superior to Ontario and Quebec. Western plans a southerly line into the United States which would eventually be continued to the eastern Canadian provinces.

Even if Canada's government should fail to approve the U. S. plan to export Texas gas, it would take at least 2 years for Trans-Canada to build its line. Western's proposal is so vague in regard to an anticipated time it might reach eastern Canada, it offers the populous Canadian provinces even less hope for an early supply of Alberta gas.

Petrochemicals . . . Like crude and natural gas, Canada's petrochemical industry is hampered by the fact its raw material is distant from mass consumption centers of the Eastern provinces. With the exception of refinery gas in Ontario and Quebec, the basic sources of petrochemicals are in the western provinces.

In spite of this natural obstacle that is common to every phase of its petroleum industry, Canada has a total of 23 plants in some phase of petrochemical manufacture either in operation or under construction representing a total cost of $216 million. The new plants will turn out a total of 34 specific chemicals based on petroleum and natural gas in addition to such products as synthetic rubber, furnace blacks, explosives, lubricating-oil additives and detergents from petroleum basics and intermediates.

Polymer Opens Research Lab

SARNIA, Ont.—Polymer Corp., Ltd., of Canada last week opened a new $250,000 research laboratory here. The opening coincided with the tenth anniversary of initial production at the $65,000,000 government-owned synthetic-rubber plant.

According to J. D. Barrington, president of Polymer, the company has an annual research budget approaching $1,000,000. Raw stocks for synthetic rubber and other petrochemical manufacture come from the local refineries of Imperial Oil, Ltd., and Canadian Oil Cos., Ltd., and from Sun Oil Co.'s Toledo plant.

The Sarnia laboratory is now equipped with Canada's third electron microscope, a $25,000 instrument which will magnify up to 120,000 times.

Land Sale Not Fixed Policy

REGINA.—The fact that Saskatchewan recently sold crown rights on eight parcels of land in the Fosterton region does not mean that the action should be regarded as a precedent in future handling of the province's mineral affairs.

Premier T. C. Douglas emphasized that his government will "treat every situation on its merits, having in mind whatever kind of arrangement would bring the best possible return for the people." He said the sale of the Fosterton land for $2,531,074 does not mean that the government will dispose of crown mineral rights in a similar manner in other sections.

Alberta Firms to Merge

CALGARY, Alta.—A proposed merger of Anglo-Canadian Oil Co., Ltd., and Calmont Oils, Ltd., has been approved, G. E. Watt, president of Calmont, disclosed last week.

Terms of the agreement provide for transfer of 4½ shares of Calmont for each share of Anglo-Canadian.

Both firms have substantial production and acreage under lease in Alberta. Anglo-Canadian properties include oil production in Leduc-Woodbend, Redwater, Turner Valley, Camrose, and Golden Spike fields and gas reserves in South Viking and Turin fields. The firm also holds considerable undeveloped acreage. Calmont has oil production in Turner Valley, Leduc, and Golden Spike, gas reserves in Turner Valley and Leduc, and either owns or has interest in leases on more than 300,000 acres in the province.

New Price Hike Urged

Crude price must go higher if sufficient wells are to be drilled to meet projected demand gains, T.M.O.G.A. told

Henry D. Ralph

HOUSTON.—The price of crude oil must be increased to support a higher rate of well drilling or else the country will not be able to supply the demand within a few years.

This was declared by Robert F. Windfohr, Fort Worth producer, in his address as outgoing president of the Texas Mid-Continent Oil and Gas Association at the annual meeting here October 6-7.

The present oversupply of oil is simply an "inventory recession" which is of the industry's own making and which should disappear within a short time, he said, but this does not alter the facts indicating the need for a higher price for crude.

"The past and present increases in consumption, if projected, indicate a future demand for domestic crude at some indeterminate point in the future, perhaps 3, 5, 8, or 10 years hence, that cannot possibly be fulfilled at today's rate of drilling and discovery, without dipping into national reserves," Windfohr said.

"I believe that the national interest, both of the consumer and of the military, and the nation's interest in a sound domestic industry, as advocated in our national oil policy, require a substantial increase in the rate of drilling, an increase of the order of 8,000 to 10,000 additional wells per year.

"I believe that this needed increase can be affected only through the medium of advances in price, so therefore, I believe that one of the most important problems facing this nation, and certainly the most important problem facing this industry, is the need for further raises in the price of petroleum and its products."

Ideal price . . . Sooner or later, Windfohr said, the market price for crude must approximate the ideal price, and he defined the ideal price as the lowest price which, under prevailing tax conditions, will produce the amount of drilling necessary to provide the discoveries needed to insure the consumer a continuity of supply.

He pointed out that the price of oil today does not affect the supply next month or next year, but rather some 5 to 10 years hence, and explained that when the price of crude more than doubled during the 2 years immediately following the war, the industry increased its drilling from 30,000 wells in 1946 to 46,000 wells 5 years later.

At present, he said, the rate of drilling has remained almost static for 2 years, indicating that the price is too low to develop the reserves which will be needed in a few years.

Industry at fault . . . The industry's current inventory problems are of its own making because consumption of petroleum products has continued to rise steadily, Windfohr said. He attributed it to mistakes in importing and in domestic production.

During the first half of this year imports of crude oil east of the Rockies increased 11 per cent over the same part of last year, but during the third quarter they increased less than 2 per cent, he said, adding:

"This restraint on the part of the importers, exercised to greater extent by some than by others, if continued to the point where their collective first-half excesses are neutralized, will be one very important bit of evidence that the industry can, in fact, solve its own problems."

In domestic production the mistake was in borrowing from the nation's military reserve, Windfohr declared. He referred to the military request that the industry maintain a reserve producing capacity within the limits of MER of 1,000,000 bbl. per day.

The fact that we do not have a reserve capacity larger than that today means, he said, that the industry now has no usable excess productive capacity, and that any production anywhere in the nation that has found its way into inventory storage, because it was produced in excess of current demand, is actually national-defense oil that has been transferred from underground storage to aboveground storage.

Tax Danger Cited

Senate minority leader Johnson warns repeal of depletion allowance is tempting to government as source of revenue

HOUSTON.—Warnings that the oil industry's depletion allowance in the federal income tax is in serious danger of repeal or reduction were given the annual meeting of the Texas Mid-Continent Oil and Gas Association by three speakers.

Sen. Lyndon B. Johnson of Texas, minority leader of the Senate, said that government officials, in looking for new sources of revenue to replace taxes scheduled for early expiration, are viewing the 27½ per cent depletion allowance as a tempting potential source of quick revenue and are not aware that reduction of the allowance would reduce drilling and exploration and cut down the nation's reserves of crude oil.

He urged the industry to redouble its efforts to inform the public of the need for the depletion allowance, and also on its national problems of imports and prices.

The oil industry, the senator declared, "has been elbowed into a position of economic nonsense" by being asked to build up a big reserve producing capacity and at the same time to operate on a price level below the cost of replacing the crude and to compete with a flood of imported oil.

A similar position on the depletion allowance was taken by two executives of major companies who addressed the meeting: H. S. M. Burns, president of Shell Oil Co., and J. Sayles Leach, chairman of the board of The Texas Co.

Brick in wall . . . Burns said oil men should work harder at the job of telling people that depletion is a physical fact as well as an item on the income-tax return, saying:

"The statutory depletion allowance is merely one brick in the edifice which is called the economics of the oil industry. Pull it out or damage it and the whole edifice totters. The depletion allowance is an incentive which is taken into account in calculating the risks of exploration and exploratory drilling. Without it the odds would change and the incentive could disappear."

Both Burns and Leach stressed the need for a united front among all branches of the industry, saying that the industry is essentially integrated and while its various elements com-

pete vigorously with each other they are completely interdependent on each other and should join in solving problems of the entire industry.

On the controversial subject of imports, Leach said that The Texas Co. is adhering to the announced policy that imports should supplement but not supplant domestic production. He pointed out that national security would be endangered if imports were cut off, and said that imports of crude oil have increased only by about the amount of increase in the national consumption of oil.

FPC position . . . The new chairman of the Federal Power Commission, Jerome K. Kuykendall, told the producers that the FPC is doing everything it can to induce the Supreme Court to reverse the Circuit Court decision in the case of Phillips Petroleum Co. which threatens to apply rate regulation to gas producers and gatherers.

Outlining his philosophy of utility regulation, Kuykendall said that it is not the main function of his agency to maintain a ceiling on the price of gas, but rather to make certain that transmission companies do not make exorbitant profits by reason of their monopolistic utility position.

At the same time, he said, the commission has the obligation to see that the pipe lines have earnings, in good times and bad, high enough to attract capital for expansion.

"The Federal Power Commission," he said, "has no authority to compel a utility under its control to absorb the additional expenses brought about by inflation and to render the customer of the utility immune from them. On the contrary, the law requires us to fix rates that will yield a fair return after all expenses have been met."

Harry W. Bass of Dallas, drilling contractor and independent operator, was elected president of the Texas Mid-Continent Oil and Gas Association for the coming year.

Reelected were Charles E. Simons, Dallas, executive vice president; Andrew M. Howsley, Albany, general counsel; and Eugene McElvaney, Dallas, treasurer.

Four new district vice presidents were elected: J. Harold Dunn, Shamrock Oil & Gas Corp., for the Amarillo Panhandle; Perry Bass, Richardson & Bass, Fort Worth, North Central Texas; Lester Clark, independent, Breckenridge, West Central Texas; and Clay Underwood, independent, Wichita Falls, North Texas.

The association's 1953 distinguished service awards, presented annually to an independent operator and a major company official, were conferred this year on Amon G. Carter, Fort Worth publisher and independent oil producer, and Hines H. Baker, Houston, president of Humble Oil & Refining Co. *(The Oil and Gas Journal, October 5, page 150).*

GEOLOGICAL SOCIETY PRESIDENTS, serving as representatives of the Mid-Continent Council of Geological Societies, met in Wichita to discuss future plans for the organization. They are, left to right: Paul E. Fitzgerald, Dowell Incorporated, Tulsa; W. H. Fitzgerald, Continental Oil Co., Panhandle (alternate); Donato Cipriani, Jr., Phillips Petroleum Co., Ardmore; James D. Kersey, Seneca Oil Co., Shawnee; Graydon L. Meholin, Sinclair Oil & Gas Co., Panhandle (alternate); Harold S. Edwards, Stanolind Oil & Gas Co., Abilene; Robert F. Dewey, Vickers Petroleum Co., Oklahoma City; and William G. Iverson, Derby Oil Co., Kansas Geological Society. The next meeting is to be in Oklahoma City in 1955.

Atom to Assist Oil

Atomic age here, but geologist is still expected to find additional energy for nation, McGee tells A.A.P.G. group

John C. McCaslin

WICHITA. — Atomic energy will supplement but not take the place of oil and gas consumption in the United States in the foreseeable future.

That was the theme of a keynote speech prepared by Dean A. McGee and delivered by Jean C. Finley at the Mid-Continent regional meeting of the American Association of Petroleum Geologists here October 1-2. The meeting was sponsored by the Kansas Geological Society in cooperation with the Mid-Continent Council of Geological Societies.

McGee, executive vice president of Kerr-McGee Industries, Inc., is hospitalized with a back ailment.

More than 1,000 geologists heard Finley quote McGee as saying "atomic energy ultimately will have a profound effect on the energy markets of the United States and the world but petroleum geologists will continue to be called upon to supply the nation's ever-increasing energy needs."

The United States now uses fifty times more energy than it did 150 years ago. Oil and gas supply 57 per cent of the country's energy needs. Despite temporary slackening of demand for oil and gas, such as now, a steadily increasing demand is predicted.

McGee's speech pointed out that "140 lbs. of U-235 has been estimated to be the equivalent in energy of all the oil and its products consumed in the United States in 1 year."

McGee wrote that "while we have performed through the years a praiseworthy job, it has only been in the last 15 years that we have hit our stride." Geologists and geophysicists have worked in close harmony in the last 15 years to uncover about one-half the oil that has been discovered in this country since the first well at Titusville.

No new prospecting methods are indicated in the near future, the speech went on to say, so stepped-up teamwork is necessary to continue the search for more oil and gas reserves. Prospectors must look again into the older producing areas. Geologists must pioneer the testing of the nation's untested sedimentary basins, and oil-finders must look into the deeper portions of the structural basins. It will also be necessary to develop the country's tidelands. McGee's speech let it be known that no job is too big for the industry's geologists and geophysicists.

New cross-section . . . Graydon L. Meholin, Sinclair Oil & Gas Co., Amarillo, reviewed recent developments in the western part of the Anadarko basin,

one of the country's most active exploratory areas, and discussed a west-east cross-section recently constructed by the stratigraphic committee of the Panhandle Geological Society.

Meholin pointed out that in 1949 there were 16 deep wells and two new fields from which to draw conclusions for the cross-section. There are now 80 deep wells and 14 new fields in the Texas and Oklahoma Panhandles. Two new upper Morrow gas fields are in prospect for the area this year.

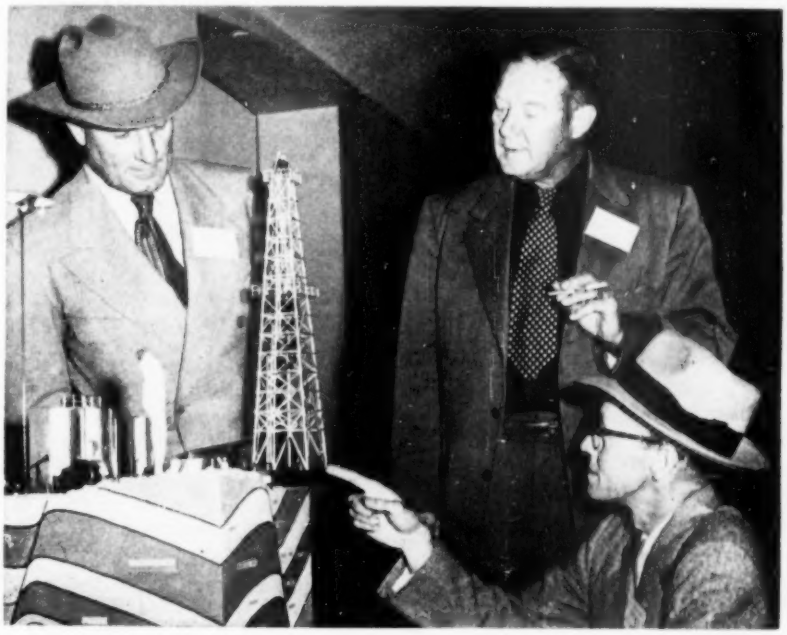
Meholin said that Roberts County, Texas' new Quinduno field, a Permian producer with 62 oil wells and 3 gas wells, has one well producing from the Pennsylvanian granite wash, indicating the possibility of comparable production to Elk City field along the same trend. Most of the area's new production is entirely Pennsylvanian, the most widespread producing horizon being the upper Morrow gas sand.

Non-reef limestones . . . John Emery Adams, Standard Oil Co. of Texas at Midland, told the assembled geologists that less than 5 per cent of limestone deposits are of the reef type, and that many major oil fields of the world produce from bedded limestone reservoirs. Frank B. Conselman, Abilene, Tex., consultant, also pointed out that non-reef carbonate reservoirs include prolific oil reservoirs, despite the emphasis on reefs in recent research and development programs. "Approximately 20 to 25 per cent of the world's reserves are believed to be contained in non-reef carbonate rocks," according to Conselman.

L.P.G. storage . . . G. H. Lancaster of Stanolind Oil & Gas Co., Ellinwood, Kans., said development of underground storage of LPG in salt cavities has been rapid in the past 2 to 3 years. Additional storage is needed in the nation's market areas. Most storage is located in the producing areas at present. Lancaster said that an adequate salt section, a fresh water supply to wash out the salt, and disposal facilities for produced brine are the three basic requirements for an effective underground salt cavity storage project. The availability and evaluation of these requirements were discussed as applied to Stanolind's underground storage project at the Stano plant in Hugoton field, Kansas.

Formation fracturing . . . George Roberts, Jr., Stanolind, Tulsa, suggested that the geologist become familiar with the possibility that many oil-bearing strata previously considered to lack adequate permeability for commercial production might now be made commercial by deep penetrating formation fracturing. *(See page 193 for a discussion of fracturing as an exploratory tool.)*

In the few years since artificial fracturing of formations came into the picture, more than 25,000 treatments have been made in this country, according to Warren L. Sallee and Fred E. Rugg of Dowell, Incorporated, Tulsa. Clifford W. Matthews, Western Co., Midland, reported that formation fracturing by hydraulic process is gaining headway to increase gas production in Hugoton field. A new type acid-kerosine emulsion has been used as a fracturing medium in the marginal areas of the field where the Permian-Chase group shows a facies change from dolomites and limestones in the eastern and central part of the field to clastic equivalents up dip along the western margin.



VISITING CONTRACTORS examine a model rig on display during the A.A.O.D.C. convention. Left to right are Glenn W. Peel, of Peel Drilling Co., Hoisington, Kans., and Jet Drilling Co., Denver; Glenn A. Campbell, Campbell Drilling Co., Tulsa; and A. J. Courson, Dee Miller Drilling Co., Denver.

Contractors' Pitfall

A rig doesn't automatically make money just because it's running—careful bookkeeping is a must, A.A.O.D.C. told

Ted A. Armstrong

DENVER.—Drilling contractors who aren't making money need to pay more attention to their bookkeeping and worry less about the technical aspects of making hole.

They need to put more of their own money into their business, borrow less, buy only the equipment they can put to profitable use, and get rid of the mistaken idea that just because their wheels are turning they are showing a profit.

This is what more than 900 contractors and equipment men were told here last week by Eugene McElvaney, vice president of the First National Bank, Dallas.

Addressing the thirteenth annual meeting of the American Association of Oilwell Drilling Contractors, McElvaney said:

"There is too much emphasis on the technical aspects of getting a hole down. Financial know-how is essential. And probably the most important factor is the necessity for the owner of a contracting firm to have his own money covering his own risks." No combination of technical knowledge, skill, or ability, he said, is a substitute for financial participation by the owner.

The cardinal weakness of the drilling contractor, McElvaney suggested, probably is "the insatiable desire for additional equipment." Some are inclined to go "rig crazy, following the mistaken theory that if four rigs make

NEW PRESIDENT of the A.A.O.D.C. is K. L. Kellogg, right, of K. L. Kellogg & Sons, Compton, Calif., shown here with the outgoing association president, F. Weldon Brigance, of Rowan Drilling Co., Inc., Fort Worth.

a certain profit, eight rigs will make twice as much—with no regard for how those rigs are acquired."

Banker's view . . . From the standpoint of the banker, McElvaney said, contracting generally is the most hazardous risk in the lending business. If the figures were available, he said, it probably could be shown easily that more loans are charged off in this activity than in any other.

This view, he emphasized, applies to all types of contracting, including dam construction, building erection, and other work, as well as drilling.

The principal reason, he said, is that the drilling contractor has little in the way of self-liquidating assets. Without real estate, merchandise in stock, or other easily convertible substance, his principal assets are his drilling rigs. These, McElvaney declared, are nothing more than hole-making machines and the tools of the contractor's trade, and a bank prefers not to take them in.

In other remarks, the visiting banker told the contractors:

. . . Bank loans on rigs are not "prime paper." When a rig becomes idle and the contractor is unable to pay, the very situation which made the rig idle automatically lessens its value to the lender. Only exceptions are those in which the experience, background, and reputation of the contractor are a guarantee.

"A stacked rig is just a batch of pig iron on a vacant lot. It has no universal demand. It is only valuable to another contractor."

. . . A rig can be a burden as well as an asset. Their current worth "may fall to a fraction of their intrinsic value, but debts against them continue at 100 cents on the dollar."

. . . One rig, in excellent condition, containing the latest scientific developments, fully equipped and with all necessary auxiliaries, can be far more profitable than half a dozen rigs of marginal efficiency. One rig, meeting the highest standards, is a business all in itself.

(The symposium on the effect of drilling fluids on rate of penetration, presented at the A.A.O.D.C. meeting, will appear in the engineering section of the October 19 issue of the Journal. Papers to be included are (1) Gulf Coast, by E. H. Lancaster, Jr., Magnet Cove Barium Corp., Houston; (2) Ark-La-Tex, by R. W. Waddell, Delta Drilling Co., Tyler, Tex.; (3) Permian Basin, by J. S. Bell, Henry Black & Sons, Midland, Tex.; and (4) California, James D. Hawkins, Macco Corp., Long Beach.)

A.A.O.D.C. Elects Officers

DENVER.—K. L. Kellogg, of K. L. Kellogg & Sons, Compton, Calif., was named president of the American Association of Oilwell Drilling Contractors at the thirteenth annual meeting of the association here October 4-6.

Kellogg succeeds F. Weldon Brigance, of Rowan Drilling Co., Inc., Fort Worth.

E. Dale Mount, of Harry Bass Drilling Co., Dallas, was elected vice president at large. Other vice presidents elected are J. S. Bell, Henry Black & Sons, Midland, for Texas and New Mexico; Field M. Davis, Field Drilling Co., San Antonio, Gulf Coast; N. H. Wheless, Jr., Wheless Drilling Co., Shreveport, cretaceous and tertiary basins; Gail C. Culter, Culter Drilling Co., Tulsa, cable tools; Dee A. Sikes, Helmerich & Payne, Inc., Tulsa, Central Mid-Continent; J. K. Kellogg, of K. L. Kellogg & Sons, Compton, Calif., for California; J. V. Boxell, Calvert Drilling, Inc., Olney, Ill., for Illinois, Michigan, Indiana, and Kentucky; Bert Sager, Dunbar Drilling Co., Denver, for Rocky Mountains; and J. P. (Bum) Gibbins, of J. P. (Bum) Gibbins, Inc., Midland, well servicing.

W. L. McClusky, of M. J. Delaney Co., Dallas, was named secretary, and L. A. Beecherl, of McDaniel & Beecherl Drilling Co., Dallas, was reelected treasurer.

New Report Form Approved

DENVER.—A uniform drilling-report form designed to eliminate misunderstandings between contractors and operators was approved by directors of the American Association of Oilwell Drilling Contractors at the annual convention here October 4-6.

The newly adopted form will be presented to the American Petroleum Institute for consideration at its annual meeting in November and will later be submitted to other trade associations.

Contractors drilling on a day-work basis are paid according to information in the driller's report. In most cases at present the oil companies and contractors use their own forms, which differ in details, thereby permitting different interpretation of the work performed.

The new form, if universally adopted, would eliminate these misunderstandings, the contractors believe.

Stray-Current Headache

How to install rectifiers in corrosion-prevention systems to avoid damaging other structures termed serious problem

John C. Reidel

TULSA.—How to avoid damage to underground structures by stray currents from nearby rectifier installations in corrosion-prevention systems is becoming an increasingly serious problem.

Many lines, many owners, and poor maps showing location of existing structures complicate the problem, C. A. Erickson, Jr., Peoples Natural Gas Co., Pittsburgh, told the South Central regional meeting of the National Association of Corrosion Engineers held here October 7-9.

The number of rectifiers installed, Erickson said, is growing steadily. In many cases they are spaced arbitrarily without regard for structures belonging to other companies. There is a definite need, he said, for closer cooperation between the companies concerned at the engineering level. "Once the rectifier is in it is too late to do anything about it. The time to do something about it is during the planning and engineering stages of the project."

The problem, he said, is particularly acute in the heavily populated areas but must be considered a major one everywhere. In the Pennsylvania-New York-West Virginia area is a complex network of gas, oil, product, and water lines, underground cables and railroads. In a remote, heavily wooded section of Pennsylvania, a recent pipe-line project crossed 450 other lines in only 150 miles.

Situation complex . . . "Many of the gas, oil, and water lines are owned by small local companies which do not have corrosion engineers or adequate maps of their facilities or an appreciation of the advantages of cathodic protection," Erickson said. "In addition many of the lines are very old. There are thousands of miles of operating lines which are 50 or more years old."

There are thousands of oil, gas, and water wells which are almost impossible to protect against stray currents. Underground gas-storage installations are in the same category, he said.

Solution . . . Smaller rectifiers, distributed ground beds, insulating flanges, coatings, sacrificial anodes or any other suitable device should be used to localize and minimize stray currents, Erickson said.

Also, he said, standard procedures should be set up by a national engineering association for testing and clearing stray currents.

Before making any rectifier installation, he said, a company should obtain maps of all the existing piping and structures which may be affected by the project. A check should be made on oil, gas, product and water lines; power and telephone cables; and oil, gas, and water wells. The ground beds then should be located with the advice and consent of those who will be affected.

Demand Closing Gap

Products demand increase retards storage additions

ADDITIONS to product storage have been slowed to a walk over the past 3 weeks, but more of the reduction was due to increases in demand than to reduced refinery runs. However, the summer additions to stocks were so large that the reduction in runs was necessary to help relieve the pressure on product markets.

Refinery runs averaged about 6,922,000 bbl. daily for the 3-week period ended October 3 compared with 7,226,000 bbl. daily for the preceding 3-week period, down 304,000 bbl. daily. Refinery production of the four major products decreased only 178,000 bbl. daily or 2.7 per cent compared with the decrease of 4.2 per cent in runs.

Additions to major product stocks averaged about 83,000 bbl. daily for the past 3 weeks. Since the average for the previous 3 weeks was 817,000 bbl. daily, stock additions were slowed down by about 734,000 bbl. daily. This cut back could not be accounted for by a reduction in product production of only 178,000 bbl. daily. Increased demand also was an important factor.

Market break didn't come . . . Based on current A.P.I. data, total demand for crude and products in the 3-week period ended October 3 was estimated at 8,165,000 bbl. daily, an increase of almost 10 per cent over the average for the preceding 3 weeks. Part of the increase represents a normal seasonal gain, but the sudden jump in demand that came just as refinery runs were being reduced calls attention to the fact that some secondary suppliers and consumers had been holding back on purchases of heating oils for the winter looking for a break in the market.

Further evidence that part of the demand increase was due to delayed purchases is found in the fact that most of the gain was in demand for kerosine and distillate fuel. Indicated kerosine demand was up more than 75 per cent for the 3-week period compared with the preceding 3 weeks. Distillate demand increased about 50 per cent. The big gains in heating oil demands normally do not come until about the time consumers make their first refill purchases in the heating season. Reductions in runs probably influenced the return to the market by the hold-out buyers.

Refiners were forced to cut runs because of full storage tanks. Buyers are back in the market because they are convinced that the low of the market has been reached.

Part of the reduction in new supply of products that came from the reduction in refinery runs was lost because of a gain in product imports in the last 3 weeks. Product imports reported by the A.P.I. for the 3 weeks ended October 3, averaged about 80,000 bbl. daily more than for the 3 preceding weeks. Most of this gain was in residual fuel which normally increases during the winter months. Residual fuel markets have not been under pressure from excess stocks for several months. Total residual stocks on October 3 were down to 51,912,000 bbl. from 54,617,000 bbl. at the same time last year.

The smaller relative cuts in major product output at refineries, compared with the reduction in crude runs, indicates a probable reduction in stocks of unfinished oils at refineries, including cracking stocks.

Arkansas Cuts Output

EL DORADO, Ark. — Arkansas' maximum allowable was cut 15 per cent as a result of an emergency order issued early last week by the Arkansas Oil and Gas Commission. The action was taken because of excessive above-ground stocks.

Total allowable for September was 87,600 bbl. daily and currently is about 82,000 bbl. daily. The cut was effective at 7 a.m. October 6.

The commission notified producers and purchasers that it will hold an emergency meeting at Texarkana on October 16 for further review of the crude situation.

Cathodes Cheaper

Holiday-free line coating too costly, N.A.C.E. told

TULSA.—It is more economical to install external cathodic protection on a reasonably well-coated pipe line than to undergo the effort and cost necessary to insure a perfect holiday-free coating, members of the National Association of Corrosion Engineers were told here last week.

L. G. Sharpe, Humble Pipe Line Co., Houston, said the cost of such cathodic protection to supplement the imperfections in a coating is relatively small, amounting to only a fraction of the cost of a complete inspection job.

"'Even the best conventional pipeline enamel-coating jobs are not holiday-free." Sharp said. However, to insure the best possible, expenses must be incurred for: (1) coating reinforcement, (2) complete holiday inspection, (3) rock shield, (4) ditch padding.

Sharpe said the maximum coating for general use when supplemented with cathodic protection appears to be 3/32-in. enamel wrapped with felt.

Sour-crude gathering . . . An economic study of several different methods of controlling internal corrosion on sour-crude gathering systems showed that any of the methods will result in substantial savings when compared to operating such lines without protection.

These savings ranged from at least 10 cents to as much as 22 cents per foot per year, depending upon the method employed, Sharpe said. Methods studied included internal linings, inhibitor treatments, nonmetallic construction materials, and nonferrous construction materials.

Tank bottoms . . . Sharpe said that a cathodic system to protect tank bottoms externally will pay out in 1½ years on the average. The figure was based on a 2-year check of the cost of external corrosion of unprotected tank bottoms as against the average cost of cathodic protection.

Total annual operating expense, he said, is about 25 per cent of the average annual bottoms-repair cost when unprotected.

Drilling Angles

Directional drilling has become so popular in West Coast fields, 20 per cent of 1953 wells were slant-hole drilled

LOS ANGELES.—Slant hole or directional drilling is becoming such a routine practice in California fields that during the first half of the year about 20 per cent of the wells were slant-hole drilled.

The method is being used extensively at Huntington Beach and Wilmington for developing under-ocean pools. At Sansinena, in the east Los Angeles area, all development has been by slant holes to avoid interfering with the many fine homes and orchards. In mountainous fields, such as Ventura Avenue, many of the wells are slanted from multiple locations in order to reduce road and drill-site work.

The Pacific Petroleum Chapter of A.I.M.E. was told recently slant-hole drilling can be used to reach out about 3 miles if the pays are fairly deep.

One coastal California producer completed earlier this year was deflected 10,233 ft. horizontally in drilling to a vertical depth of 4,240 ft. Maximum angle from vertical was 75°—or at times just 15° from horizontal drilling.

Above 70° wells . . . A portion of a directional drilling forum devoted to wells having drift angles over 70° was led by D. S. Johnston of Signal Oil & Gas Co. Other members of the five-man panel were J. T. Ledbetter, Union Oil Co.; Carl Vogelsang, Long Beach Oil Development Co.; Leonard Graves, Southwest Exploration Co.; and E. H. Benson, Richfield Oil Corp. Gordon Jackson of Eastman Oil Well Servicing Co. served as moderator.

More or less conventional drilling methods and tools can be used for drilling and completing wells with drift angles up to about 60°, Johnston declared. Above 70°, special equipment and procedure are necessary.

"The major problems which have had to be solved in drilling these wells pertain to mud circulation, drill-pipe wear, logging, running casing, cementing, testing, and cleaning up wells for completion.

"In a 70°-angle well, the circulation is similar to a stream bed, the heavier cuttings tending to remain on the low side of the hole with most of the circulation channelling on the high side. Also, during periods of no circulation any suspended cuttings have only a few inches to drop before they start piling up on the low side of the hole. Control of mud properties, mud circulation rates, and the dimensions of tools run in the hole become increasingly important, because these tools ride on the low side of the hole when pulled out."

Drill-pipe wear . . . Drill-pipe wear is greatly accelerated in high-angle wells, Johnston declared, necessitating hard-facing of tool joints and a rigid inspection program. A first application of tungsten carbide does not eliminate wear but after a second addition of the hard-facing material the joints are practically free from wear. This is expensive, he said, but it permits use of the drill pipe until erosion reduces the thickness of the tube. When a certain wall thickness is reached the joint then is retired. Fatigue has not been found to be a problem.

To prevent wear in the surface casing, the drill pipe is equipped with rubber protectors. Because the lower portion of the casing receives the most wear, the last two joints are strengthened with reenforcing bands. Wire lines will not drop in a 70°-angle hole and surveying instruments must be pumped down the drill string. A method for running electrical logs on drill pipe also had to be developed, Johnston declared.

Drilling by feel . . . Friction becomes quite a problem when drilling at angles above 70°. Drilling is carried out more on a basis of feel and experience, for while the weight indicator might show a 10-ton weight is being carried, actually only 2 tons might be applied on the bit.

"In running casing only 34 per cent of the weight of the casing is effective in a down-the-hole direction. About 94 per cent of the casing weight is normal to the slope of the hole as a friction force component. Equipment to keep the pipe full at all times, to reduce friction, and to allow for passage of fluid through casing run in close-hole tolerance, had to be developed.

"Cementing becomes a particular problem due to the increased tendency for channelling of light mud over heavier cement. Also, the impossibility of working the casing during cementing operations makes successful cementing more difficult."

Johnston suggested the use of lightweight cement, "approximately the same weight as the mud so that the cement won't settle out."

Signal's present practice for testing for water shut-off employs a tester which does not require the use of slips or any rotation of the drill stem throughout the operation. This, he added, is because "conventional testers are hard to set and, in some cases, even more difficult to retrieve from 70° wells."

Due to the stream-bed type of flow on these wells, cleaning out the cuttings for well completion presents a particular problem, Johnston declared. Methods of bailing with drill pipe and for

KEPT BUSY during the recent meeting of the Pacific Coast chapter of the American Institute of Mining and Metallurgical Engineers were: J. Shannon Baker, Lane-Wells Co.; F. Lowry Wadsworth, General Petroleum Corp., chairman of Pacific Coast chapter; Nick D'Arcy, section chairman; Morton T. Higgs, Lane-Wells, general chairman of fall meeting committee; and Kemp E. Barley, Baroid Sales Division, arrangements chairman.

reverse circulating oil without putting pressure on the zone are now being quite successfully employed.

Slant-hole economics . . . J. T. Ledbetter discussed the economics of directional drilling, with most of his statements being based on Union's experiences at the Sansinena field. He said the advantages of slant holes outweigh their disadvantages.

Over-all cost of wells drilled at less than 45° angles is about the same as for conventional wells, he stated. Because more weight can be applied on the bit actual drilling time is speeded up by about 50 per cent. In addition, he added, there are fewer sites to be prepared and fewer roads to be built when only a few drill sites are employed.

Better Scrubber Needed

Design of oil-bath equipment must be improved to cope with high transmission pressure, demand for cleaner gas

D. H. Stormont

LOS ANGELES.—Dirty pipe-line gas is going to cause more and more trouble in gas-transmission operations unless existing designs of oil-bath scrubbers are improved.

The efficiency of present oil-bath scrubbers is becoming unsatisfactory because of more stringent operating requirements and a growing demand for cleaner gas, R. C. Baird, Fluor Corp., Ltd., told members of the California Natural Gasoline Association at the organization's annual meeting here October 8.

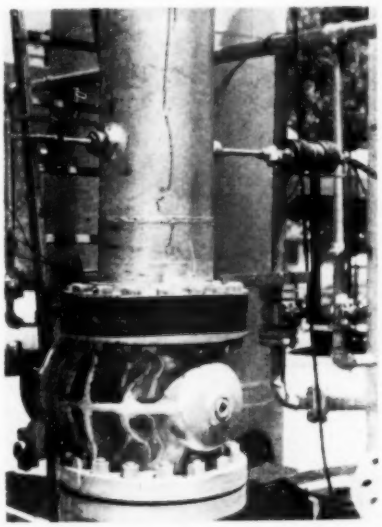
Increasing pressures used in transmission lines make it more difficult for hydrocarbon oils to scrub the hydrocarbon gases. It is largely for this reason, Baird said, that more and more trouble may be expected unless a thorough study is made of the effect of high-pressure gas on the physical characteristics of the scrubber oil itself.

Future gas-cleaning requirements he said will no doubt become more stringent, "particularly for older pipe lines, as they are pushed to their pressure limits and tend to become more corroded.

"The trend is toward the use of more acid gas as time goes on, which, unless carefully treated, will result in increased dust contamination. The increased treating phase itself will require the installation of more liquid-removal equipment."

High-pressure service . . . While centrifugal, electrostatic, or filtration methods can be applied effectively to pipeline gas cleaning, the oil-bath scrubber offers the most economical and effective method, he said, if it is improved for high-pressure service.

At high pressure some of the gas will go into solution with the oil, the exact amount being a function of the equilibrium constants of all the hydrocarbons involved, he said. Actual analysis of field samples has demonstrated



HIGH-PRESSURE SAMPLING PROBE installed downstream from scrubber.

that at 500 psi., scrubber oil may change density by as much as 5 to 10 per cent due to the adsorption of pipeline gas. Calculations show this would amount to about 20 per cent at 850 psi.

"The change in scrubber oil density produced in this way is accompanied by alterations in both viscosity and surface tension. The general result of all these changes is to increase foaming tendency and the formation of extremely small-sized droplets. This makes it easier for the gas to carry reservoir oil upward to the mist-removal section in greater and perhaps overloading quantities.

"Retrograde vaporization of scrubber oil is another serious consideration for hydrocarbon scrubbing oils operating at pressures greater than approximately 800 psi. As the pipe-line pressure reduces downstream, this oil will condense out on the pipe wall. Unmistakable evidence of the occurrence of this phenomenon at 850 psi. has been observed under field conditions."

For these and other reasons Baird believes more consideration will have to be given to the use of nonhydrocarbon liquids for pressures in excess of approximately 500 psi. Low vapor-pressure chemical plasticizers were mentioned as an example, but these are scarce and costly and probably will not be adopted in the near future, he said.

New gas-sampling tool . . . Acquisition and analysis of gas samples for the purpose of measuring a scrubber's dirt and mist-removal efficiencies have been greatly simplified by a new sampling probe developed by Fluor research engineers, Baird said.

The new tool, he said, makes it possible to secure accurate efficiency data in a matter of days. The sample gas stream is drawn isokinetically, as determined by two sets of static pressure holes, one on the outer and one on the inner wall of the probe. The assembly can be installed so as to allow for traversing the pipe.

Based on preliminary tests he believes about 6 hours is sufficient for obtaining a sample. The tests also indicate the degree of contamination, especially in older pipe lines, can vary widely and rapidly depending upon throughput.

Production Cut

Tide Water shuts down 600 wells; blames oil excess

LOS ANGELES.—Excessive petroleum stocks were blamed by Tide Water Associated Oil Co. in ordering a 4,300-bbl. cut-back in its California heavy-oil production.

The reduction was brought about by closing 600 producers in the Kern River field near Bakersfield. The wells produce 12°-gravity crude and are located on fee-owned properties.

Tide Water's action is believed to reflect only its individual inventory situation. It is not expected that other major companies will take similar steps, at least not at this time.

California stocks of all oils have increased about 80,000 bbl. daily this year. This is about what crude imports have averaged. Only a minor portion of the gain has been in heavy crude and residual stocks and industry-wide both are judged to be at good working levels

Gasoline and stove and diesel oil stocks have showed the gains. Gasoline is estimated to be 6,000,000 bbl. above the first of the year and diesel and stove oils at 4,000,000 higher. Of the estimated 19,000,000 bbl. total increase, residuals are estimated to account for only 2,000,000 bbl.

Union Well Finds Deep Pay in Torrey Canyon

Torrey Canyon, spectacular 1952 discovery in the foothills overlooking the Santa Clara River in Ventura County, California, has been given a new deeper pool. Union Oil Co. 92 Torrey (right well in photograph) was completed flowing 139 bbl. of 27°-gravity crude from perforated intervals between 12,737-14,888 ft., approximately 3,000 ft. below the field's lower Sespe pay. The well, drilled from an elevation of 1,880 ft., cased off 2,500 ft. of Sespe oil sand.

Ammonia From Gas

Natural gas, cheaper than coke, will be the raw material used in new ammonia plants, natural-gasoline group told

LOS ANGELES. — New ammonia plants, built beyond the 3,500,000-ton annual capacity planned for late 1955, will use natural gas or byproduct hydrogen as a raw material and not coke.

This is because ammonia production from gas is roughly half as expensive, F. D. Kuenzly of Shell Chemical Corp., Ventura, Calif., said last week at the fall meeting of the California Natural Gasoline Association here October 8-9.

He said, "To produce only the crude hydrogen-nitrogen mixture required for the synthesis of ammonia, approximately 35,000 cu. ft. of natural gas per ton of ammonia is required compared to about 1.4 tons of coke. Both figures include the raw materials consumed in the production of hydrogen and the steam used in the gas-producing processes. If 30 cents per M.c.f. is paid for natural gas, then coke would have to sell for $7.50 per ton to be competitive; it is quoted from $10 to $15 per ton in the coal mining areas."

Record of growth . . . The accompanying table shows that natural gas accounted for only 8 per cent of the ammonia produced in 1940. Last year it reached the 50 per cent mark and by 1955 it is expected to approximate 81 per cent. Ammonia produced from coke is expected to drop from the 44 per cent level of 1952 to only 12 per cent in 1955 he stated.

The fact that natural-gas plants had lower operating costs caused three of the four government coke plants built during World War II to be converted to gas. The country's largest plant, that of Allied Chemical & Dye Corp., at Hopewell, Va., is now using natural gas, Kuenzly believed.

Most of the ammonia capacity increases completed since 1945 have been by expanding existing plants he pointed out. Of the three new ones built, two are using electrolytic hydrogen and one, the Mississippi Chemical plant at Yazoo City, Miss., is employing natural gas. The 22 plants in operation last year produced slightly over 2,000,000 tons he declared.

Several new plants are to be finished this year, out of the approximately 25 projects under way, or planned. By the end of 1955 the annual capacity will be about 3,500,000 short tons annually, he said, "a figure that would have sounded fantastic at the end of World War II."

ESTIMATED U. S. SYNTHETIC AMMONIA—CAPACITY AND PRODUCTION

	Per cent capacity based on			Ammonia, 1,000 short tons	
Year:	Coke	Byprod. H_2	Nat. gas	Ann. cap.	Ann. prod.
1925	49	51		19	16
1930	93	7		197	142
1935	89	5	6	417	182
1940	86	6	8	460	435
1945	59	3	38	1,593	1,100
1950	55	3	42	1,940	1,566
1952	44	6	50	2,118	2,020
1955	12	7	81	3,485	

Movie Lot Well Started

LOS ANGELES.—If 20th Century-Fox Film Corp. wants to film a movie on oil-well drilling, it can now do so without leaving studio property.

Universal Consolidated Oil Co. began rigging a test well last week on a 260-acre lease it obtained from the film company. A drilling island was prepared near Olympic Boulevard in Beverly Hills for the slant-hole drilling location. An all-electric rig will be used and the derrick will be sound-proofed.

Ohio Well Passes 4 Miles

BAKERSFIELD. — Ohio Oil Co.'s deep test in the Paloma field near here last week became the first well ever drilled past the 4-mile mark.

Already easily the deepest well ever drilled, the well was drilling ahead at 21,136 ft.

ROCKY MOUNTAIN

Shale Development Forecast

GLENWOOD SPRINGS, Colo.—A. C. Rubel, vice president and director of Union Oil Co. of California has predicted the development of a multimillion-dollar oil-shale industry for western Colorado within the next 10 years.

Rubel voiced his prediction in connection with a survey of Colorado's water supplies by a state water-conservation board. He said he believes major oil companies will begin development of their oil-shale holdings in the next 5 to 10 years.

Tell Ertl, head of Ohio State's mining and petroleum engineering schools who is a Union Oil consultant, declared western Colorado's oil shale reserves are 10 times greater than proved oil reserves in the United States.

Rubber Sale Falters

Synthetics plants may never be turned over to private industry as a result of late provisions added by Congress

Bertram F. Linz

WASHINGTON.—Complicated provisions written into the Rubber-Plant Disposal Act by the Senate may make impossible the planned sale of the Government's synthetic-rubber facilities to private industry.

Because of these provisions, there are indications that the oil, rubber and chemical companies which last spring expressed a willingness to buy the plants for delivery next year are cooling off to their purchase for delivery in 1956.

Instead of buying the government plants there is a possibility that new plants may be built by industry if the demand for new rubber increases to the point where it can compete with the Government.

New developments in polyesters which may make present facilities obsolete and new developments in butyl rubber that may seriously depress the value of existing copolymer plants, plus the inevitable charges of "give away" and "favoritism" when and if the plants are sold, may tend to dampen the enthusiasm of possible bidders.

The legislation authorizing sale of the plants, as approved by President Eisenhower August 7, provided for the establishment of a commission to handle negotiations, develop a disposal pattern, secure the approval of the attorney general and report to Congress. So far, the President has named only two of the three members of the commission and has given no indication when the third will be appointed.

First bill changed . . . As introduced in the House of Representatives the legislation contemplated the transfer of the government facilities to private industry before next summer. It provided a bidding period of 90 days and a negotiation period of 4 months.

When the measure reached the Senate it ran into partisan politics and, apparently, some sentiment for continuation of government ownership, being approved by the Senate banking committee by a purely partisan vote with all the Republicans for and all the Democrats against it.

The changes which jeopardize the sale of the plants, however, were made on the floor of the Senate, where the bidding period was extended to not less than 6 months and the negotiation period to not less than 7 months.

From the standpoint of prospective bidders, however, the most disturbing amendment was a provision that any single item in the sales program could be rejected by Congress, which would have deprived buyers of the plants of the assurance of supply and market which the House had given them. While the Senate refused to abandon its amendment, it did accept a provision that if one of the facilities recommended for sale is disapproved all purchasers may withdraw their offers.

Thus, as it stands, if either the House or Senate, in 1956, disapproves the sale of a butadiene plant to an oil company the up-to-then successful bidders for every other plant can pull out and the Government might have a white elephant on its hands.

Justice on the spot . . . Another provision written into the bill by the Senate is seen as highly embarrassing to the Department of Justice. It provides that instead of advising that the proposed sales pattern is not inconsistent with the antitrust laws, the attorney general is to give a written opinion to that effect and in addition must set forth findings approving the type of disposal program which will best foster the development of a free competitive synthetic rubber industry.

There is considerable doubt whether the attorney general will be willing to make such findings which, being of a judicial nature, could be used against him in any future antitrust actions. And if the attorney general refused to make those findings there could be no disposal program.

Background . . . To provide a substitute for the natural rubber supply cut off during the war the Government invested $700,000,000 in synthetic plants, about $500,000,000 of it in the facilities it still holds.

Since the end of the war a number of disposal programs have been proposed, but for one reason or another Congress decided to keep the industry in the hands of the Government until this year. Some of the synthetic facilities, however, were sold after the war, when they were no longer needed for the rubber-production program.

Disposal of the plants was disapproved by Congress in 1948 as being premature in view of the small stockpile of natural rubber and the uncertainty whether synthetic rubber could hold its market at a time when the price differential was favorable to natural.

In 1950, President Truman again recommended that the plants be sold, but the same situation existed as in 1948 and, in addition there was uncertainty over the situation in the Far East.

By last spring, however, the stockpile goal had been met, synthetic rubber was securely established and there was a good supply of natural rubber moving, and President Eisenhower told Congress in April the time had come to undertake plant disposal.

Congress gave the President the legislation he requested. But there is a big question whether it will prove workable and whether, finally, the Government will get out of one more business in 1956.

Nickel Control Lifted

Supplies for civilian use expected to remain tight

WASHINGTON. — All government controls over the distribution and use of nickel will be revoked November 1.

For the first time since August 15, 1951, it will be possible to secure, without government authorization, nickel-bearing stainless steel and other products containing what was for a long time one of the scarcest materials on the entire metal list.

Revocation of the emergency control order was asked of Secretary Sinclair Weeks by Defense Mobilizer Arthur S. Flemming because national defense nickel and nickel products requirements can be met without creating a significant dislocation of the normal distribution of these materials in the civilian market.

Military and atomic energy needs for the metal will be met by a program of regular purchases which will also meet stockpile requirements. Availability for civilian use will be reduced for some time, but supplies are expected to increase in the future from expanded imports.

At the same time, Flemming said, it is unfair to our own business to con-

Alkylation Plant is Big Help in Avgas Goal

More alkylation plants like this one at Esso Standard refinery at Baton Rouge, La., would be welcomed by government authorities in their efforts to boost the nation's aviation-gasoline facilities. The Petroleum Administration for Defense has tried for the past 2 years to promote a daily expansion of 30,000 bbl. in alkylate facilities, but the country is currently 20,000 bbl. short of the goal. Present supplies of avgas are adequate, but the PAD says the military would need the expanded facilities in event of war.

tinue controls while foreign competitors are free to sell in our markets the articles our companies are forbidden to manufacture.

"It is not anticipated that the supply of nicket will be adequate to meet total demands for many months," Flemming warned. "It is not argued that the shortage will fail to cause dislocation and hardship. There is dislocation and hardship under the present allocation and use controls, and the essential premise of decontrol is that the continuance of the controls will not serve to relieve or assuage that dislocation and hardship."

Capital Goes Abroad

Investments total $15,000,000,000 as manufacturing capital exceeds U. S. money in overseas oil development

WASHINGTON. — Foreign investments of United States capital now total approximately $15,000,000,000, an increase of more than 25 per cent over the $11,788,000,000 reported in 1950. Department of Commerce announced last week.

The department did not set a figure on the present foreign investment in oil, but on the basis of the $3,390,000,000 reported in 1950 it is probably in excess of $4,200,000,000.

A department report now being prepared will carry a broad and detailed review of the size and character of our foreign investments, as well as the results obtained in the way of earnings, in expanding foreign production and in providing essential commodities to domestic markets.

The report will cover the situation as it existed in 1950, when the American share in the earnings of foreign enterprises in which it had investments, after foreign taxes, was $1,800,000,000, of which $1,300,000,000 accrued to the owners as dividends or branch profits and the remaining $50,000,000 was retained by the foreign subsidiaries.

Of the more than $3,000,000,000 added to these investments since 1950, nearly half went to Canada and another $1,000,000,000 was added to investments in Latin America.

Manufacturing passes oil . . . The study showed that while petroleum investments have absorbed a larger part of the direct investment capital outflows from the United States since 1945, manufacturing investments have been growing rapidly and now exceed the total invested in oil.

Petroleum investments naturally were found to be heaviest in the oil producing areas, but the department pointed out there is some petroleum investment in nearly every country covered by the survey because of the far-flung distribution outlets of the industry as well as the growing number of refineries built in consuming areas.

The $3,390,000,000 invested in the petroleum industry abroad in 1950 was found to be divided as follows: Canada, $1,896,000,000; Latin America, $1,408,000,000; western Europe, $424,000,000; western European dependencies, $296,000,000; other countries, $844,000,000.

Carlson Wants Import Probe

WASHINGTON. — The oil-import problem came to the fore again last week with an appeal to the White House by Senator Frank Carlson of Kansas for an immediate investigation of the situation.

In a telegram to President Eisenhower, Carlson urged that a check be made into heavy imports of foreign oil which he charged have forced cutbacks in domestic production. Imports now run 1,000,000 bbl. per day and are still increasing, Carlson asserted.

The senator asked President Eisenhower to order the Interior Department to investigate the "aggravated situation" and try to work out "an amicable and satisfactory solution of this urgent problem."

Navy Tanker Rates Decline

WASHINGTON.—The Military Sea Transportation Service made contracts last month for 18 clean tankers for use by the Navy beginning in November.

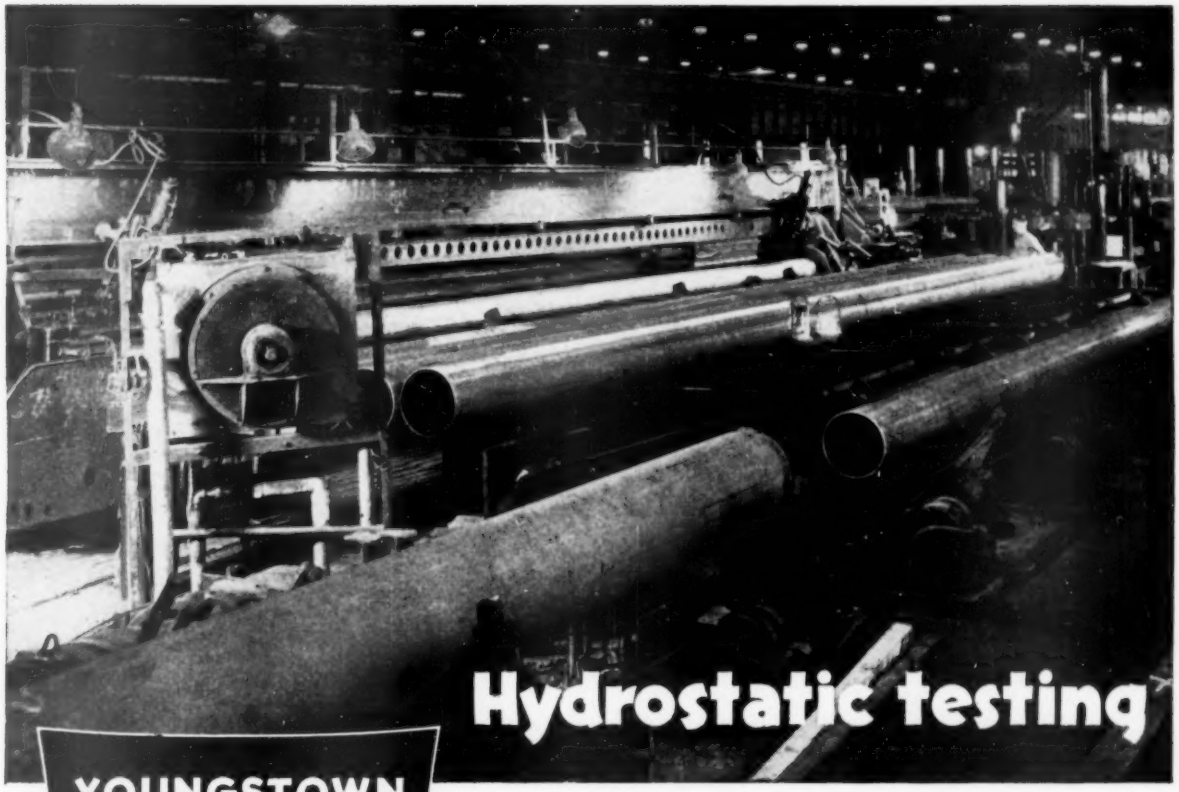
Only one of the tankers was retained from previous voyages by exercise of an option for consecutive trips. The remaining 17 were chartered for single voyages.

The MSTS report showed that tanker rates have continued to decline. The vessels were contracted at rates ranging from 25 to 32½ per cent below the basic Maritime Commission rates applicable in the area of voyage. Charters for October voyages were made at rates ranging from 15 to 16 per cent below the Maritime Commission rates.

NPC Committees Named

WASHINGTON.—The National Petroleum Council has appointed committees to make studies of a peacetime government oil and gas organization and the conflict of oil and mineral leases on the public lands.

Council Chairman Walter S. Hallanan set up a 20-man committee headed by B. Brewster Jennings, president of the Socony-Vacuum Oil Co., Inc., to recommend the type of agency in the



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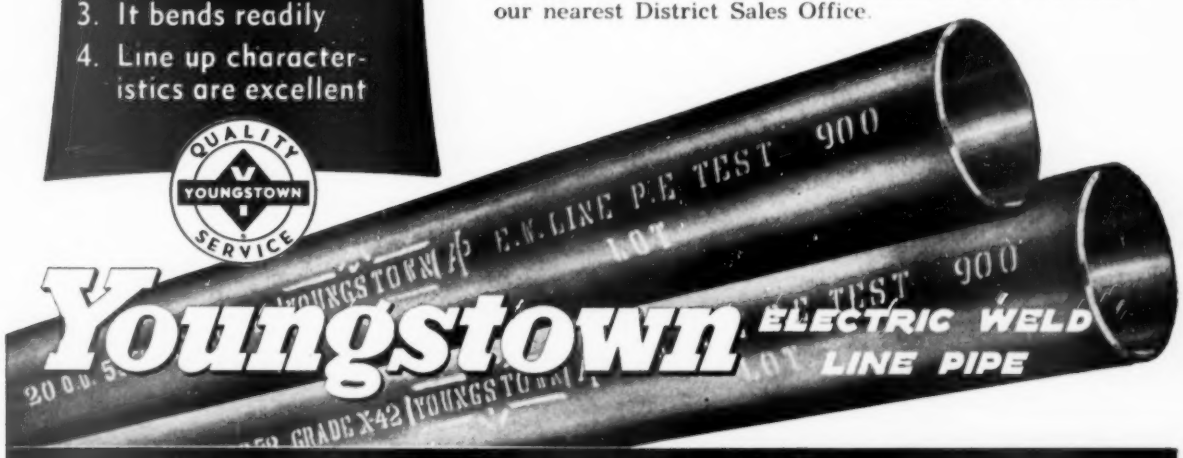
●As a final check on its soundness, every length of Youngstown Electric Weld Pipe undergoes this hydrostatic test. Filled with water under high pressure, the pipe is struck repeatedly along the weld zone with pneumatic hammers. Only perfect pipe can survive such rigorous testing.

Youngstown Electric Weld Pipe for the oil and gas industry is being made in sizes up to 22" OD and in grades as high as X52. For further information, phone or write our nearest District Sales Office.



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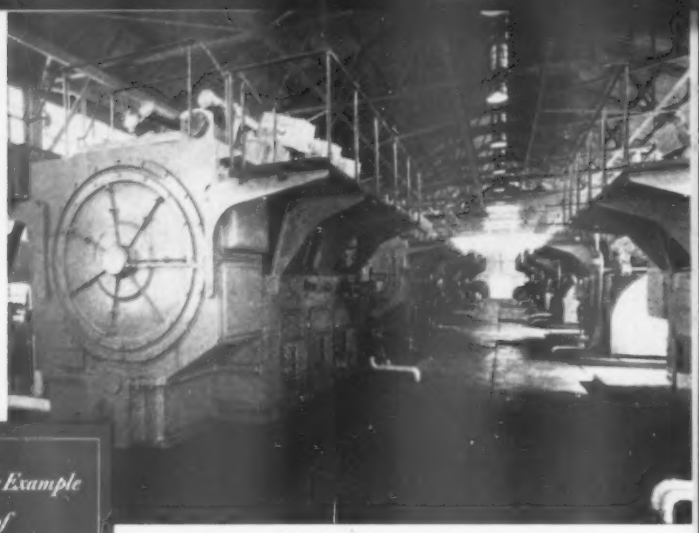
COOPER-BESSEMER HORSEPOWER MULTIPLIES 40 TIMES IN 16 YEARS

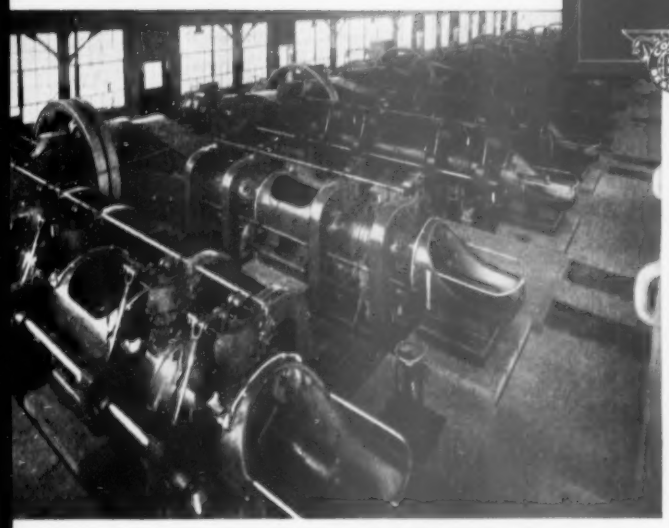
on El Paso Natural's System

AND RUNS THE GAMUT OF SERVICES . .

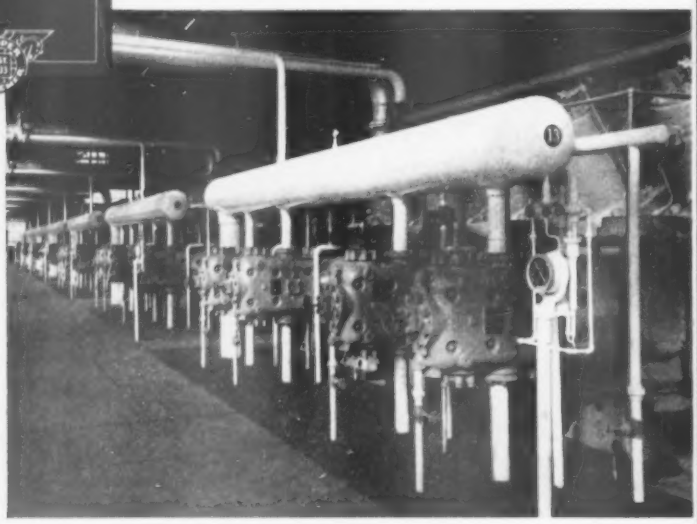
Another Example of Efficient Power at Lower Cost



One of the latest Cooper-Bessemer V-angle installations on the El Paso Natural System — big, space-saving GMW units in the Keystone, Texas, main line gas transmission station.



El Paso Natural's experience with Cooper-Bessemers started 16 years ago with this installation of seven then-modern Type 19 horizontals in their No. 1 station.



Line up of seven of the seventeen GMV-10's installed from 1948 through 1950 in El Paso Natural's modern Deming station, Gage, N. M.

EL PASO NATURAL GAS COMPANY'S remarkable growth through the years is today being climaxed by one of the largest gas pipe line expansion programs ever undertaken. If reliable, efficiently operating compressor equipment has some bearing on this success, as it must, look at the Cooper-Bessemer record . . .

Back in 1937, El Paso Natural's No. 1 station was powered with Cooper-Bessemers — seven Type 19 horizontals totalling 5250 compressor horsepower. Today, Cooper-Bessemers throughout the system exceed 200,000 horsepower! And in 1940 El Paso Natural was one of the first to take advantage of a new idea in compressor design — Cooper-Bessemer V-angles. Now, these modern, compact units . . . GMV's and big GMW's . . . alone comprise over 191,000 compressor horsepower . . . on their main lines, in gathering service, in gasoline extraction, handling residue gas and for re-pressuring.

Perhaps you should bear this in mind . . . with thermal efficiencies from 30 to 40 per cent, you'll find Cooper-Bessemers unmatched in fuel economy . . . unmatched, too, in the many other factors that add up to outstanding over-all economy. Why not discuss your requirements with the nearest Cooper-Bessemer office?

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Interior Department to succeed the Petroleum Administration for Defense next year when PAD is liquidated. It will study a return to the pre-Korea setup when the Oil and Gas Division dealt with the industry both directly and through the NPC and with the Defense Department with assistance from the Military Petroleum Advisory Board.

Hallanan also appointed a 15-man committee with A. C. Mattei, president of the Honolulu Oil Corp., as chairman, to study the problems arising from the filing of uranium claims under the mining laws in areas subject to oil and gas leases and the cross-filing of oil and gas leases covering land included in unpatented mining claims.

States Split $17,000,000

WASHINGTON.—Twenty-two states and the Territory of Alaska will receive a total of $17,255,527 from the Interior Department, as their share of government revenue from mineral leases and permits, chiefly for oil and gas, during the fiscal year 1953.

The lease money represents nearly two-thirds of the $24,115,375 distributed by the Bureau of Land Management under the several laws giving the states a share in the revenues from the sale of public lands and timber and grazing on the public lands.

Most of the money from leases and permits will go to six states—Wyoming, $5,726,097; California, $3,193,539; New Mexico, $3,087,013; Colorado, $2,581,064; Montana, $1,027,701, and Utah, $1,017,045.

Alaska Exploration Asked

WASHINGTON.—Revision of land laws and speeding up of Bureau of Land Management operations to facilitate the development of Alaska's natural resources were urged upon Interior Department officials last week by Alaska Governor B. Frank Heintzleman.

Heintzleman asked Secretary Douglas McKay and top department officials to provide more intensified minerals exploration by the Geological Survey and Bureau of Mines and take other steps that may lead to extensive exploration by industry such as is now being conducted by the Phillips Petroleum Co.

Oil Tax Receipts Still Up

WASHINGTON.—Treasury receipts from the four federal oil taxes this year continue to run ahead of previous periods but the pace of the increase is slowing down, the Internal Revenue Service disclosed last week.

In the first 7 months of the year the Treasury collected $566,590,000 from the oil taxes compared with $548,676,000 in the same period in 1952, but the only item to show a substantial increase was gasoline.

Collections from the gasoline tax amounted to $500,409,000 against $459,973,000 last year and the diesel-oil tax showed a slight increase, $8,704,000 against $8,367,000. But the revenue from lubricating oils dropped to $41,324,000 from $60,857,000 and pipe-line transportation to $16,153,000 from $19,479,000, according to IRS figures.

MID-CONTINENT

Floods Inspected

More than 320 operators and representatives visit three principal projects in Greenwood County on annual tour

Ed McGhee

EUREKA, Kans.—More than 320 representatives of Mid-Continent operators inspected the Greenwood County, Kansas, water-flood operations October 7 in the annual tour sponsored by the Kansas section of the American Institute of Mining and Metallurgical Engineers and the Kansas-Oklahoma Water Flood Operators.

Kansas' first water flood, which began operation in 1935, is located in Greenwood County. Production is from the Bartlesville sand lenses in the Cherokee shale of Pennsylvanian age.

At present there are 54 floods in operation, 17 of which are operated by Phillips Petroleum Co., 9 by Cities Service Oil Co., 6 by Ohio Oil Co., and 3 by Sinclair Oil & Gas Co. Together the 54 projects cover more than 10,600 acres.

It is estimated that more than 205,000,000 bbl. of oil had been produced by July 1 of this year and that more than 27,000,000 bbl. of this had been obtained by water flooding. Secondary-recovery operations to July 1 had required injection of 266,000,000 bbl. of water. Average water-flood recovery to date slightly exceeds 3,500 bbl. per developed acre, with several projects already having recovered more than 6,000 bbl. per acre.

Water supply . . . The lack of a sufficiently reliable fresh-water source has led to the almost exclusive use of water from wells drilled into the Arbuckle lime and the Douglas sand. Some treatment is required in most cases.

The fields are shallow, ranging from 1,800 ft. to 2,500 ft., with 10-acre spacing in most cases. Although only about 40 ft. of sand is found in most wells, permeability is generally over 25 md. with a porosity of 16 to 20 per cent.

Production ranges from 50 to more than 1,000 bbl. per day in the floods, and water production varies over a wide range.

Those participating in the tour inspected Sinclair's Browning unit, Ohio's John Atyeo Communitization, and Phillips' DeMalorie-Sowder unit.

DeMalorie-Sowder . . . Presence of iron, hydrogen sulfide and carbon dioxide in the Arbuckle water employed in this unit has necessitated an extensive injection water-treatment plant. Not only is the water treated with lime, it is also thoroughly aerated, retained in settling ponds with 3-day capacity, and pressure filtered.

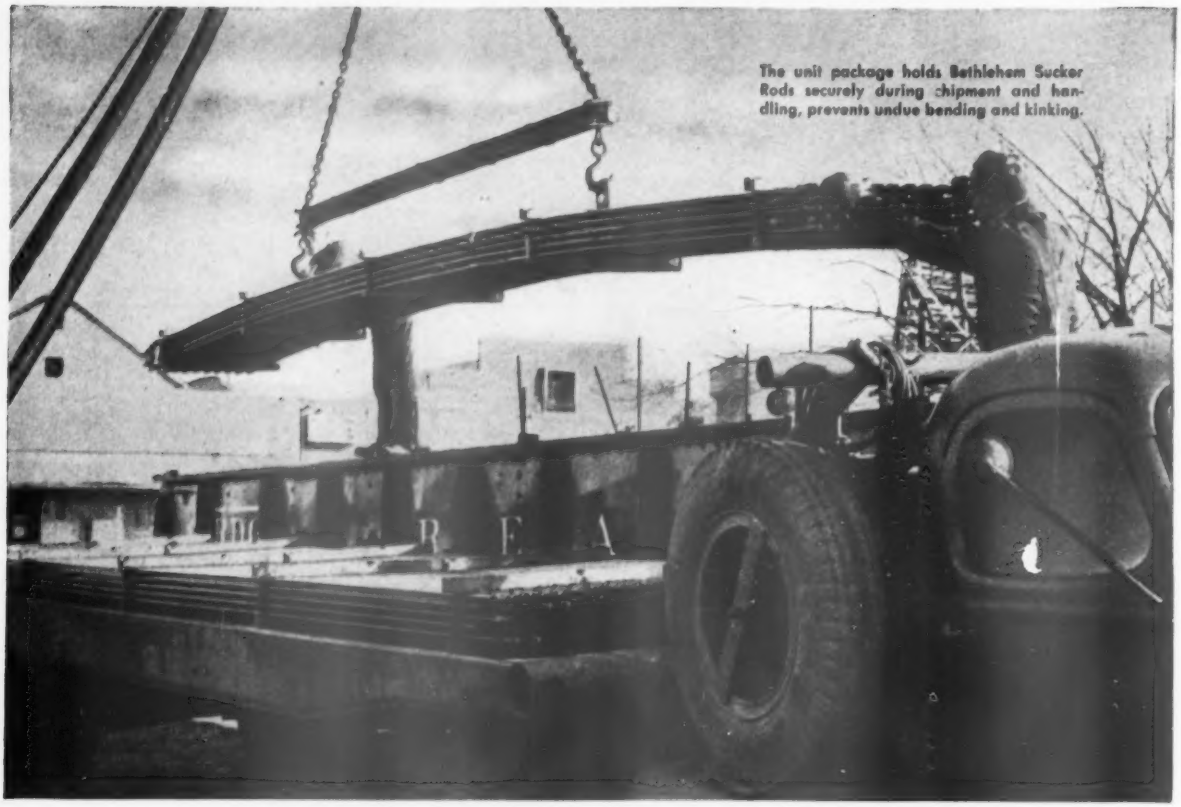
Since initial operation began in 1949, a cumulative total of 950 bbl. per developed acre has been produced and 24 water-input wells are presently active.

Browning unit . . . This is one of the only Greenwood County floods taking surface water for injection. It takes a portion of its requirements from the Verdigris River. The river water, with produced water and Douglas sand water, is gravitated through slow sand filters.

A five-spot, 10-acre spacing is used in the 180 acres presently under flood.

John Atyeo Communitization . . . A corrosive condition here has necessitated the extensive use of corrosion inhibitor in both water supply and injection wells. It is reported that the Reda pump cable in the flood's one supply well has benefited greatly from the program.

While primary recovery in this pool was 5,600 bbl. per acre, water-flood recovery is already in excess of 4,300 bbl. per acre and production is still approximately 376 bbl. daily from the 37 producing wells. Water is being injected in 25 wells.



The unit package holds Bethlehem Sucker Rods securely during shipment and handling, prevents undue bending and kinking.

No Damaged Rods

WHEN YOU USE THIS UNIT PACKAGE

There's no loss of time at yard or well due to rod damage when you use Bethlehem Sucker Rods. For the rods come in a special unit package which protects them from damage during shipment and handling.

The Bethlehem package uses grooved steel spacers, holding from 80 to 100 rods. It is conveniently handled by a gin-pole truck and lifting rig. The sucker rods fit the grooves so snugly as to prevent permanent kinking or undue bending, as well as any contact with other rods. This prevents rod defects which could lead to premature breakage.

During shipment, the Bethlehem package is held by bolts which clamp top and bottom wooden binders. It is loaded on heavy blocks. Tie-rods and bracing are also used, making the load a single, solid unit.

There are four types of Bethlehem Sucker Rods shipped in this time-saving unit package. This range of rods is sufficiently wide to cover virtually every pumping condition. We also produce a full line of sucker-rod accessories. The nearest Bethlehem sucker-rod distributor or sales office will gladly give you full information. Or write to us at Bethlehem, Pa.

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BETHLEHEM *Sucker Rods*

BETHLEHEM STEEL

New Florida Strike

State's second oil field is indicated by wildcat shows

MIAMI.—A substantial oil recovery obtained in a drill-stem test at a rank wildcat 40 miles west of here, in Dade County, Florida, has virtually assured this state of its second oil field. The discovery is approximately 40 miles southeast of Sunniland field, which until now has been the state's only production.

The wildcat, a joint venture of Commonwealth Oil Co., Coastal Caribbean Oils, Inc., and Gulf Refining Co., recovered the oil from a dolomitic zone of lower Cretaceous age in which at least 11½ ft. of effective pay was indicated. Interval tested was at 11,314-47 ft.

During the drill-stem test, lasting 12 hours and made through ⅝-in. bottom and ¼-in. top chokes, the well flowed an ungaged volume of oil. Recovery at the end was 2,185 ft. of 23°-gravity clean oil plus 270 ft. of salt water and 90 ft. of mud and water. Indicated bottom-hole pressure while flowing was 1,028 psi. Shut-in pressure was 4,273 psi. There is a possibility, according to operators, that the salt water recovered in the test may have been the salt water with which the hole was being drilled prior to the test.

To be deepened . . . The prospective well is designated as 1 Wiseheart-State Board of Education. Spot location is listed as 1,205 ft. from the east line and 115 ft. from the south line of 16-54s-35e. Drilling of the well is being contracted by Tristate Drilling Co.

Operators are planning to run a string of 7-in. casing through the zone, but it is probable the hole will be deepened since the Sunniland zone, producing horizon of the Sunniland field and principal objective, has not been reached.

Sunniland field, located in northern Collier County, and currently the state's only production, was discovered by Humble Oil & Refining Co. in 1943. It has 12 producing wells, all but one of which are on the pump. All were completed prior to the past 2 years.

Several weeks ago, another Florida wildcat, Gulf Refining Co. 1 Consolidated Naval Stores, located 27 miles northwest of Humble's Sunniland field in Lee County, encountered promising oil showings in the Sunniland section, which is of lower Cretaceous-Glen Rose age, and in a drill-stem at 11,741-99 ft. recovered some oil, indicating another possible field. However, the showings were not considered commercial, and the test, since drilled to 12,858 ft., is shut down waiting on a decision to abandon it.

New Deep Wildcat Tested

FRANKLIN, La. — Shell Oil Co. last week was on the verge of breaking its own record for the world's deepest commercial production.

Shell is testing through perforations from 17,260-17,306 ft. at 2 Gonsoulin-Minville, in Weeks Island field of Iberia Parish, coastal Louisiana. This is about 85 ft. deeper than the Miocene pay which is yielding gas-condensate at 17,039-17,122 ft. in Shell 1 Weeks Gall Unit.

The latest hole is bottomed at 18,568 ft., and is the deepest well yet drilled at Weeks Island. It is only about 100 ft. short of establishing a new depth record for Louisiana. This record is held by Magnolia Petroleum Co. with its 1-D Ragley Lumber Co., in Allen Parish, completed as a dry hole at 18,660 ft.

The 2 Gonsoulin has already been drilled 568 ft. deeper than originally planned. Projected depth of the test was 18,000 ft.

Improved drilling techniques have enabled Shell drilling crews to drill the 2 Gonsoulin with a minimum of trouble. More than 17,000 ft. of hole was made in about 90 days, and about 1,000 ft. of hole was cut in one 30-day period.

Dual Completions Sought

NEW ORLEANS. — The Commissioner of Conservation will hold a public hearing here at 10 a.m. October 14 on the application of Kerr-McGee Oil Industries, Inc., to complete dually all existing wells and those to be drilled in Breton Sound Area Block 36 field, Plaquemines Parish.

Kerr-McGee's application lists five wells in the field with gas-distillate production in sands at nine depths ranging from 2,700 ft. to 6,700 ft. The applicant seeks to process the production through central battery system facilities capable of processing 30,000,000 cu. ft. of gas per day.

Permission is also sought to commingle this production with that from the Block 20 and Block 36 fields in barges for transportation.

$20,000,000 Sale Predicted

HOUSTON. — About $20,000,000 will be added to the permanent Texas Public Free School Fund from the sale of tidelands mineral rights by the state December 1, Land Commissioner Bascom Giles estimated here.

Giles made the prediction here at a meeting of the Houston Real Estate Board. The commissioner said University of Texas and A. & M. College lands brought $16,300,000 during a sale in June, but that he was "confident" the sale on December 1 which will include 500,000 acres of offshore leases, will top all previous records.

Operators had asked for 650,000 acres for leasing, but since the exact location of the 3-league line has not yet been determined, the board decided not to offer any leases beyond 9 miles. Tracts will be offered in blocks of 640, 1,440, 2,880, and 5,760 acres.

Indicated Producer Tested

ARCADIA, Tex.—The Texas Co. is testing what may be a deep commercial producer on the upper Texas Gulf Coast, 1 W. E. Eggers Gas Unit, 3 miles southwest of here in Galveston County.

The company was reported to be testing "a rich gas find" at 14,400 ft. The test is a tight hole and no official information is being released. The hole was spudded in in May and is about 3 miles from the prolific Chocolate Bayou field of Brazoria County.

The Texaco test is on a 320-acre lease in A. G. Reynolds Survey. The nearby Chocolate Bayou field produces oil from 8,660 ft. to about 12,900 ft.

Natural Gas Refund Ordered

WASHINGTON.—United Gas Pipe Line Co. of Shreveport was ordered by a Federal Communications examiner to refund $2,826,293 to the Mississippi River Fuel Corp., St. Louis, for natural gas sold between March 1950 and December 1952. The ruling was made in connection with a dispute over a supplementary rate schedule.

The examiner ruled that United Gas must file with the FPC adjustments on its charges for gas during the period under dispute and the adjustments must be filed within 30 days. The decision becomes final unless a review of the case is ordered within 1 month.

Paint on oil-tank roof "STILL LIKE NEW"

— after more than 3 years rough service

The entire floating roof of this oil tank is protected with a coating based on VINYLITE Brand Resins.

Service conditions are rough. Direct rays of the sun beat down. Water accumulates in low spots. Yet, the coater reports that, today,

"the deck on the first tank which is now over three years old looks just as good as the day they [our men] walked away from it."

Compare this performance. The small photo shows a tank side finished at the same time with ordinary paint. Direct sun isn't so great a factor. Yet, paint failure and rust stains are very evident. However, note the top rim, finished with a coating based on VINYLITE Resins, is in excellent condition.

Hundreds of case histories show that coatings based on VINYLITE Resins do a better, longer-lasting job in rough service. This is true whether applied on metal, masonry, or other materials. It's specially true where there is exposure to rough treatment, chemicals, salt water, weather extremes, industrial gases. Properly applied, these coatings won't crack, chip, peel or fade. They protect for years, require no maintenance, and save many dollars on your operating costs.

For a list of suppliers and a copy of our free booklets, "BAKELITE and VINYLITE Resins for the Petroleum Industry," and "BAKELITE and VINYLITE Resins for the Chemical Industry," write Dept. RX-68.

Photos courtesy Plastic Coating Corporation, Houston, Texas.

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Texans Take to Floods

Sharp jump in secondary-recovery projects said due to scarcity of new fields, crude-price hike, and research

AUSTIN.—Oil operators in Texas are becoming increasingly sold on the merit of secondary-recovery operations.

Programs now in progress in the state, not counting the salt water injected to maintain pressure in East Texas field, will recover roughly half a billion barrels of additional oil. Just one project—the huge SACROC flood of Kelly-Snyder field, Scurry County—would more than double this figure. The SACROC project, still awaiting approval of field rules but almost certain to get Texas Railroad Commission approval, is expected to recover between 720,000,000 and 795,000,000 bbl. of secondary oil.

At the beginning of 1952, there were water or gas-injection projects under way in 254 fields. During the year, projects were launched in 112 fields to set a new record. During the first 9 months of 1953, projects were approved in 83 fields, hearings had been held on 9 (with approval expected soon), and hearings were scheduled on 11 more at the first of October.

Price hike a factor . . . The pace has quickened since the price of crude was raised in mid-June. Through July 1953 approvals averaged just over seven a month. Twelve water and gas-injection programs were approved in August—16 more in September.

The Railroad Commission recently gave Barron Kidd the green light on a water-flooding program in Woolridge (Crosscut sand) field, Brown County. This field isn't listed on current proration schedules, this because it was abandoned in 1932 when crude was so cheap that the casing in three wells probably was worth more than the production.

This project, the eightieth approved this year, is a small but typical one. Kidd will have to redrill the three wells, equipping two for salt-water injection and the third for production. Walter Ford, who engineered the project, predicted additional recovery of 150,000 bbl. Before being abandoned 21 years ago, it had produced 120,000 bbl., only 23.5 per cent of the original oil in place.

Projects approved so far this year range in size from the one in Woolridge field, covering 50 acres, to the huge 50,000-acre SACROC flood.

Why the increase? . . . The increase in the number of secondary-recovery programs in Texas is attributed to three factors by Arthur Barbeck, chief engineer for the oil and gas division of the Railroad Commission.

. . . New fields are harder to find.

. . . The crude-price increase has had a stimulating effect in that programs economically questionable before now in some cases will be profitable.

. . . Continued research in secondary recovery has made such operations increasingly successful.

Four years ago, the Texas Legislature allocated $100,000 a year from the oil and gas enforcement tax to specific research into secondary recovery. The Texas Petroleum Research Committee, comprising members of the University of Texas, the Railroad Commission, and Texas A. & M. College directs the research. Masterminding the program is Dr. George Fancher of the University of Texas.

Dr. Fancher estimates that 90 per cent of the operators in Texas bought those pamphlets, and is sure that many recent programs result from this study. Barbeck said that questionnaires will be sent out in November to obtain 1953 year-end reports on secondary-recovery projects, and a revised edition of the survey will be issued next year.

The Research Committee is expecting even greater results from its next publication. It has completed work on a huge study of the possibilities for secondary recovery in all of the oil-producing counties in Texas. Now in manuscript stage, the report will be published early in 1954.

Other encouragement . . . Texas has used other methods to encourage secondary recovery. The commission is lenient on allowables, generally setting them at ability-to-produce figures and exempting the project from shutdown days. This policy was nearly scuttled when it was applied to the spectacular project in South Ward field, Ward County, started by Standard Oil Co. of Texas in July 1948. This 460-well field was down to 37,533 bbl. a month at that point. The production graph started to climb slowly as more and more operators joined the program. By December 1951, it was up to 464,867 bbl. a month. It reached a peak during 1952, when production averaged 632,777 bbl. a month. Barbeck thinks, and the figures indicate, that South Ward has reached a peak. The October 1953 allowable is 581,550 bbl., still 15 times what the field was making in 1948. But after 32,000,000 bbl. of primary production, the field turned out 7,585,330 bbl. of oil in 1952 and nearly that much in 1951 and 1953. Hopes of the engineers at the outset that water flooding would double the recovery of original oil in place from 25 to 50 per cent, seem likely to be borne out or even exceeded.

The South Ward structure is a crescent-shaped anticline, with the Yates pay divided into two zones by about 40 ft. of dolomite and thin sand stringers. Originally it was an expansion-gas drive reservoir, but pressure had declined from the original 1,300 psi. to 50 psi. when flooding started. Mainly, a five-spot, 20-acre pattern has been used, with closed systems of injection. In recent weeks, several leases in North Ward field have begun flooding in anticipation of doubling ultimate production in a similar formation.

Flood areas . . . North Texas (District 9) and West Central Texas (District 7-B) lead in number of fields in which new programs have been started this year. In District 9, water flooding has been started in 29 fields and gas repressuring in four. In District 7-B, water flooding has been started in 18 fields. Individual lease programs are not counted as separate projects in this survey.

Fancher recalls the first hearing the Railroad Commission ever held on water flooding. It was in 1935, and he was asked to testify. The Texas Co. had proposed a project in Brown County, and a number of Wichita Falls operators came down to object. After they heard the testimony as to what water flooding had done in other states the North Texans didn't object. Instead, they went back home and started to work.

As one who has pioneered in trying to sell Texas operators on secondary recovery, Fancher is naturally pleased with the recent developments. He recalled a speech he made to a West Texas oil meeting in the mid-30's, predicting projects such as South Ward.

"The speech just didn't go over at all," Fancher said. "In fact, it fell so flat that I didn't even have it published. I guess it was just 15 or 20 years too early."

LATIN AMERICA

Peron Changing Spots?

Argentina may relax grip on foreign capital in attempt to close gap between lagging production, booming demand

THE Argentine Government is considering special incentives, beyond those in the recently enacted foreign-investments law, in an effort to attract urgently needed oil capital from abroad.

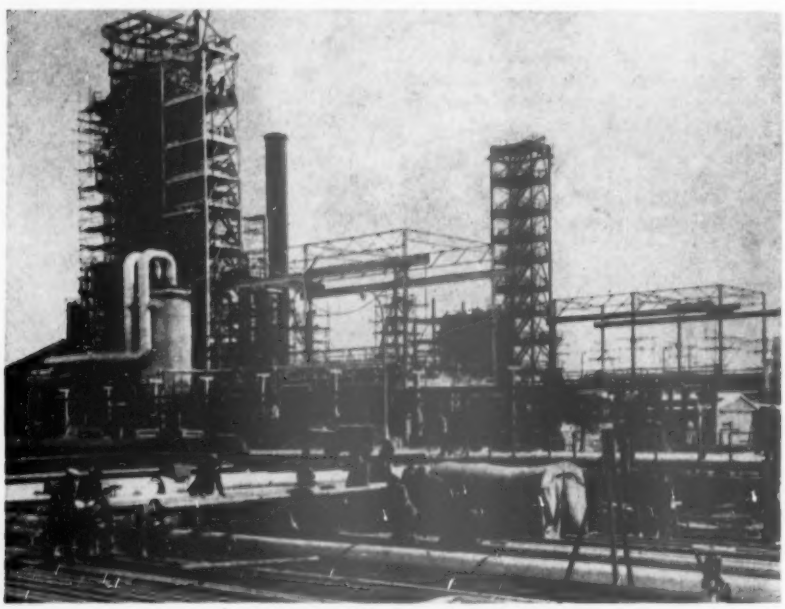
Many American oil men, and especially officials of the larger companies, believe the Peron government must make substantial modifications in its highly nationalistic oil policy before any large amounts of outside oil money will flow into the country (*The Oil and Gas Journal, September 14, page 97*).

According to recent reports from Buenos Aires, the government is studying legislation under which foreign companies would sign special construction and service contracts. Although the government would retain complete control over refining, distribution, and sale of the oil, profits to be earned in exploration and development would depend on the risks involved and could be higher than the 8 per cent maximum allowed new mining and manufacturing enterprises for remittance abroad under the present foreign-investments law.

Because it is known that the government is directing its principal effort at obtaining foreign oil capital, shares of stock in local oil companies have risen sharply on the exchange in Buenos Aires. For years, private oil companies in Argentina have been gradually squeezed by government policy and the operations of Yacimientos Petroliferos Fiscales, the integrated government oil company. The government's apparent change of heart has resulted from the fact that domestic production has increased only slightly over the last 10 years and it now meets only about 40 per cent of the fast-growing internal demand.

Heavy demands are being made on the Argentine economy because of the industrialization program, and the failure of domestic oil production to keep pace with consumption aggravates the country's difficulties. The current foreign exchange drain for fuel imports, mostly oil, averages half a million dollars daily. Under the second 5-year plan beginning next January, the government oil production goal by 1957 is a production of about 120,000 bbl. daily compared with the present approximately 70,000 bbl. daily. The government plans to invest Argentine pesos equivalent to about $280,000,000 in its oil industry during that period.

Government officials have discussed the country's oil problems recently with representatives of both Dresser Industries, Inc., Dallas, and Hudson Engineering Corp., Houston. These talks were described as being only "exploratory."



Kent Plant Big Factor in U. K. Refinery Expansion

By the end of next year total refining capacity in the United Kingdom will amount to slightly less than 30,000,000 metric tons annually, or approximately 600,000 bbl. daily. The tremendous refinery construction program carried out in Britain in the last 5 years has made the country the leading European refiner and given it a substantial export potential in motor gasoline and heavy fuel oil above domestic requirements. A major unit in the British refining industry is the Kent refinery of Anglo-Iranian Oil Co., Ltd., on the Thames Estuary. This plant, which will have an eventual capacity of 80,000 bbl. daily, went on stream early this year. The general view here shows the No. 1 and No. 2 vacuum units at Kent.

Deep Well Dry

Shell ends 5-month testing of deepest hole outside U.S.

THE deepest hole ever drilled outside of the United States, Shell's LS-1387 in the east Lagunillas field of the Maracaibo basin, is being abandoned after 5 months of testing.

The hole reached bottom at 17,537 ft. in April this year, 25 months after its spudding in March 1951. Drilling progress was exceptionally slow due to steep dips.

Currently, Shell is attempting to recover the casing. The oil string was run to 16,700 ft. and left hanging when high temperatures made it impossible to set with cement.

Shell has six other holes drilling or testing at depths greater than 10,000 ft., all in western Venezuela. Four are in the Mara-La Paz-Concepcion fields on the western edge of Lake Maracaibo, one is in lake waters several miles offshore, and one, 1 Friata, is in virgin country south of the lake and about 40 miles southeast of the Tarra field. All are presumed to be aimed at the Cretaceous, which has yielded a few spectacular wells of up to 30,000

bbl. daily potential since the first strike in 1945.

The second deepest hole in Venezuela, Creole's 2 Alturitas in bad-Indian country just north of the Rio Negro on the western side of the lake, was drilled to 17,265 ft. in about 1 year's time, starting in June last year. However, liner collapsed before testing of the bottom hole could begin. The same thing had happened in 1 Alturitas and precluded testing of the Cretaceous. On the current well, Creole has sidetracked around the liner to 17,173 ft., and testing will begin shortly.

No Delivery, No Deal

Contract held terminated by deficient deliveries

A NEW York State Supreme Court arbitrator has held that Cie. Francaise des Petroles was acting within its rights in 1950 when it terminated an oil-sales agreement with Pantepec Oil Co., C.A.

C.F.P. terminated the agreement as of August 11, 1950, because of deficient deliveries under the contract. Pantepec challenged C.F.P's right to terminate and claimed that its refusal to lift further shipment constituted wilful default and made the French company liable for damages.

The Pantepec-C.F.P. sales agreement was signed October 26, 1946. Under it, the French company agreed to buy specified quantities of Venezuelan crude oil from 1947 through 1950. In 1949, Pantepec was committed to deliver 7,200,000 bbl. of which at least 1,800,000 bbl. was to be Roble oil, a more desirable crude than that from Mulata field.

The arbitrator, Bernard Hershkopf, held that the contract deliveries constituted binding and mandatory commitments on Pantepec. As for actual deliveries, he found that the Venezuelan company's failure to fulfill the obligations of the agreement was "at all times serious, continuous, and most substantial." In 1949, the year on which C.F.P. terminated the agreement, Pantepec delivered 4,347,808 bbl. against the 7,200,000 bbl. due and furnished only 825,959 bbl. of Roble oil.

FAR EAST

Oil Talks Slated

Firms to discuss Bengal exploration with India

REPRESENTATIVES of Standard-Vacuum Oil Co., Burmah Oil Co., Ltd., and American Overseas Petroleum, Ltd. (Caltex), were scheduled to begin conferences with Indian Government officials early this month to discuss terms for oil exploration in western Bengal.

Topics to be discussed, according to an Indian announcement, include the extent of government participation, taxation, and guaranteed returns.

Standard-Vacuum did considerable aerial magnetometer work over the Bengal basin in East Pakistan and eastern India about 2 years ago, and subsequently approached the Indian Government on terms to continue the exploration on a more detailed basis.

In an effort to bring more than one company into exploration of this large region, Indian Government officials then invited the other two companies to consider taking parts of the area. All three companies are now building refineries in India under agreements containing clauses relating to the use of indigenous oil where available.

India has a petroleum law, but when considered together with taxation and other legislation, the total government take from a successful operation amounts to about 75 per cent. It is doubtful that any wide-scale exploration will be undertaken unless these requirements are scaled down.

Damages Asked

A.I.O.C. sues Nippon firm importing Iranian oil

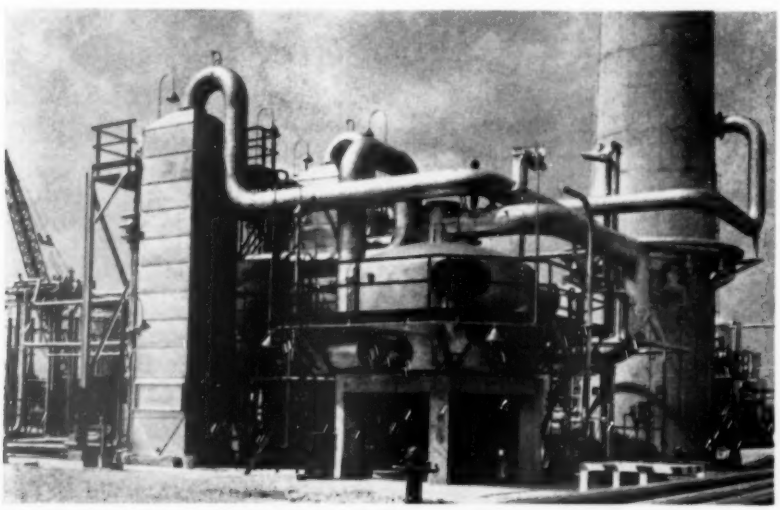
A JAPANESE district court in Tokyo has opened preliminary hearings on the claim of Anglo-Iranian Oil Co., Ltd. for $1,120,000 compensation against Idemitsu Oil Co.

The sum is asked for two cargoes of oil imported by Idemitsu from the nationalized properties of Anglo-Iranian in Iran and sold on the Japanese market. Basis of Anglo-Iranian's claim is that the properties were taken by the Iranian Government in violation of the concession contract, that no compensation has been paid, and that, hence, it is still the rightful owner of the oil.

Anglo-Iranian sought to have the oil brought by Idemitsu impounded pending a decision in the ownership case, but its request was refused by the district court and the ruling upheld in appellate court.

Idemitsu has imported about 550,000 bbl. of products thus far in four shipments, three by the Nissyo Maru and one by the chartered Koei Maru. It has been using a $1,400,000 currency allocation but the Japanese Government has said it will grant no further exchange for Iranian oil imports.

Lower prices . . . Idemitsu's managing director, Keisuke Idemitsu, left for Teheran late in September to discuss prices paid for the oil with Iranian officials. An Idemitsu official said an effort would be made to have prices



Fawley Refinery Has New Sulfur Recovery Unit

With the buildup of basic refining facilities now largely completed, refiners in the United Kingdom are giving attention to the construction of specialized process equipment to diversify and improve production. One such unit is the recently completed sulfur-recovery plant at Britain's largest refinery, the 140,000-bbl. daily plant of Esso Petroleum Co., Ltd., at Fawley. It produces 40 long tons daily of elemental sulfur of a purity of more than 99½ per cent, using mainly H_2S recovered from the lighter products of the catalytic cracking process.

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TYPICAL APPLICATIONS

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adjusted for the oil already imported. He said Idemitsu had paid so much money, including court expenses, in making the imports that the government in Teheran would be asked to lower the price to below half the world level. Iran's now ousted Prime Minister Mossadegh had agreed to sell oil to Idemitsu at half the world price.

The Idemitsu official said that the company had $250,000 left of its original exchange allocation, sufficient for one more shipment. The Nissyo Maru was scheduled to leave Japan September 29 to pick up the last load.

The Iranian Government disclosed in Teheran that the total quantity of oil sold since Anglo-Iranian was forced out amounted to 120,000 tons (about 900,000 bbl.) for which the government company operating the properties had received $1,860,000. This includes both the Idemitsu shipments and several cargoes taken by Italian buyers.

EUROPE

Italian Fuels Compete

Gas, fuel oil competition may bring monopoly of oil

RECENT reductions of fuel oil prices in Italy has sharpened the competition between this product and the natural-gas industry which is largely state owned.

Enrico Mattei, chairman of the Italian Government's Ente Nazionale Idrocarburi, referred to the competitive situation in a speech at the recent Second National Italian Gas Conference in Piacenza.

He said an understanding should be reached between Italian gas producers and oil refiners to put an end to this competition by establishing "zones of influence" for the two fuels in the Italian market.

Some Italian oil quarters saw in the statement an indication that the Italian Government is considering the possibility of extending the state monopoly to oil, or of tighter regulation of the oil industry, in order to solve the competitive problem. Such an intention on the part of the government was neither confirmed or denied.

In his speech at Piacenza, Mattei announced that E.N.I., which was set up earlier this year as the top organization for the Government's oil and gas operations, had decided to create a set of subsidiary companies, among them AGIP-Mineraria, and Soc. Italiana Forze Endogene. The latter company is to carry out exploration, particularly in southern Italy, for geothermic steam for the production of power. Ten billion lire, or about $16,000,000, will be spent on this work.

The E.N.I. chairman said that while exploration had made much progress recently, some difficulties have arisen in connection with the construction of natural-gas pipe lines. However, consumption of natural gas this year should reach two billion cubic meters (194,000,000 cu. ft. daily) against 1.4 billion cubic meters in 1952. In the Polesine region alone, production of natural gas is expected to reach 300 million cubic meters this year (29,000,000 cu. ft. daily.)

New German Field

Wildcat in Weser-Ems area is near Voigtei discovery

A NEW field discovery has been made in the Weser-Ems area of West Germany by the exploratory well, Barenburg 1, of Deutsche Vacuum Oel A. G. and Gewerkschaft Elwerath.

The test, which is about 7½ miles northwest of the recently discovered Voigtei field and 5 miles south of Sulingen, had an initial flow of 24 cu. m., (150 bbl.) daily of 29°-gravity crude from the Valendis of the lower Cretaceous at a depth of 690-707 m. (2,260-2,320 ft.). The well also tested about 45 bbl. daily in the Cornbrash. The structure was located by reflection seismograph.

Recent development drilling has extended several West German fields. In the new Voigtei field, also a Vacuum-Elwerath operation, a second well 4,000 ft. east of the discovery flowed about 190 bbl. daily of light crude from the Gigas of the Jurassic at 502-522 m. (1,650-7,715 ft.).

Boostedt field has been extended nearly 2 miles to the north and east by the well Boostedt 6a of Vacuum-Deutsche Erdoel-Preussag. In Elwerath's new field Stockstadt near Darmstadt in the Upper Rhine Valley, a third well has found production in the Pechelbronn formations. Other encouraging results have been obtained in Preussag's new field Lehrte near Hanover where two more wells were brought in testing 265 and 320 bbl. daily from the Cornbrash.

During the first half of 1953, German oil operators drilled a total of 263,453 m. (about 865,000 ft.) compared with 234,252 m. in the corresponding 1952 period. About half this footage was drilled in exploratory wells. Increased wildcatting was responsible for bringing the June drilling total to a new all-time monthly record of 54,587 m. (179,000 ft.).

Italian Cat Cracker Planned

A 7,000-bbl. daily capacity Thermofor catalytic cracking unit will be erected at the Trieste, Italy, refinery of Aquila S.p.A. Tecnico-Industriale.

The unit will be similar in design to that built for Vickers Petroleum at Potwin, Kans. Southwestern Engineering Co., Los Angeles, has the contract for engineering the Aquila unit, and equipment is being bought by Aquila direct from suppliers. Construction will probably get under way the first half of next year.

The Aquila refinery has a capacity of about 15,000 bbl. daily with 3,300 bbl. in thermal cracking. In 1950-51, a new reforming unit, lubricating oil and wax plants were installed. Aquila products are distributed throughout Italy by an associated company, S.p.A. Petroli Alto Adriatic.

New Lube-Oil Unit Finished

The Thermofor continuous percolation plant of the lubricating oil section of Vacuum Oil Co., Ltd.'s refinery at Coryton, was scheduled to go on stream early this month.

The plant is the first installation of its kind to be completed *(The Oil and Gas Journal, June 8, page 116)*. Similar equipment is being added at Shell's Pernis refinery in the Netherlands.

Vacuum Oil's Coryton refinery was placed in operation early this year, and it is planned to have all major construction completed by the end of this year. The refinery processes about 18,000 bbl. daily.

International Briefs

D'Arcy Exploration Co., Ltd. (Anglo-Iranian), expects to begin drilling in the near future at a location near Vittoria in southern Sicily. The test will be the company's first on its Sicilian acreage. Italian contractors will carry out the work with a rig capable of reaching between 8,000 and 10,000 ft. A subsidiary of Gulf Oil Corp. now has a well under way on the outskirts of Ragusa.

A plant for the production of nitrogenous fertilizers is planned by Brazil's National Petroleum Council near the Cubatao refinery now under construction on the outskirts of Santos. The government has made an initial grant of funds for the project, and equipment has been purchased in Germany. In addition, studies are now being made for a possible sulfur-recovery plant to be built in conjunction with the new 45,000-bbl. daily refinery.

PERSONALS

Laborer to Veep

S. G. Kershner promoted by Texas Pipe Line Co.

FROM a common laborer to vice president and general manager of a major pipe-line company—all within a span of 19 years—is the record of Stuart G. Kershner, of Houston.

Kershner last week was named by the board of directors of Texas Pipe Line Co. to fill the post left vacant by the death of J. T. Rynd, who had been vice president and general manager of the firm since last year.

Kershner, who also is a director, started working for Texas Pipe Line in 1934 as a common laborer in the East Texas division. Through the years he received various promotions and was named a vice president in 1951.

He is a native of Francis, Okla., and a graduate of the University of Texas, holding a degree in mechanical engineering. He also is a member of the Episcopal church.

His favorite hobby is hunting, especially for deer and game birds. Kershner concentrates this activity in the West Texas hill country. He often brings home a full game bag, although he freely admits that, just like anybody else, his hunting trips sometime turn out to be only long hikes.

The new general manager of Texas Pipe Line is a member of the Pipe Liners' Club of Houston, of which he is a director; the Houston Engineers' Club, and the American Society of Mechanical Engineers.

P. M. Johns, Jr., Tulsa, has been elected president of Noble Drilling Corp. to succeed **C. C. Forbes,** who has become chairman of the board of directors. Johns joined the firm in 1933 and was elected vice president and treasurer in 1948.

Guy C. Miller has been appointed traffic manager of Anchor Petroleum Co., Tulsa. He had been assistant traffic manager since 1947.

E. Alfred Duvall has been promoted by Shell Oil Co. from junior exploitation engineer at Houston to senior exploitation engineer at Odessa, Tex.

C. O. McKinney has been promoted by Standard Oil Co. (Ind.) to group leader in the technical-service division of the firm's research laboratories at Whiting, Ind. He joined Standard in 1946 as a chemical engineer in the research department at the company's Sugar Creek, Mo., refinery.

C. H. Albitz has been elected a vice president and director of Texas Pipe Line Co., Houston. Other changes

C. H. ALBITZ

MONTGOMERY

brought about by the death of J. T. Rynd, vice president and general manager who was replaced by **S. G. Kershner,** include **W. C. Montgomery,** division manager of the oil-traffic division, promoted to succeed Albitz as assistant general manager of the company, and **Fred Ashford, Jr.,** assistant division manager, promoted to division manager. Albitz worked for The Texas Co. about a year before transferring in 1928 to the pipe-line company as assistant to the civil engineer at Wichita Falls, Tex. He was named assistant general manager in 1951. Montgomery joined the company's South Texas division at Humble, Tex., in 1934, and has held several posts, including that of assistant division manager at Houston. Ashford joined the company in Houston in 1947.

Don Crall has resigned as field superintendent for Stanolind Oil & Gas Co. at Duncan, Okla., and has opened offices in Oklahoma City as a consulting petroleum engineer. He had been with Stanolind 23 years.

Stewart M. Jones, geologist and formerly with Shell Oil Co. at Seattle, has joined the California Division of Mines at San Francisco.

Paul K. Lewis, formerly maintenance foreman for Wilshire Oil Co. at Norwalk, Calif., has joined Douglas Oil Co. of California as assistant refinery superintendent at Santa Maria, Calif.

Jerald L. Stauss, of Falcon Seaboard Drilling Co., Tulsa, has been named vice president in charge of the company's operations in Rocky Mountain area. He will be in charge of operations in that area in addition to his present duties as vice president of the Mid-Continent area and treasurer of the firm. Stauss has been with Falcon Seaboard since it was organized in 1935.

Elmer H. Weaver, Union Oil Co. of California, has taken a leave of absence to become assistant director of the Office of Defense Mobilization. Weaver, Union's manager of purchases, is responsible for materials procurement for military and stockpile needs.

Dr. F. W. Crawford has been named by Phillips Petroleum Co. as manager of production research in the research division of the company's research and development department at Bartlesville, Okla. He had been technical director of the department's atomic energy division at Idaho Falls, Idaho, since January 1951. Crawford joined Phillips as a physicist in 1937.

Byron M. Kern has been promoted to chief engineer for Spencer Chemical Co., replacing **George F. Klein, Jr.,** who has joined Mechanical Design, Inc., an affiliate of Refinery Engineering Co., Tulsa, as chief engineer. Klein had been with Spencer since 1946 and had been production superintendent at the company's plant at Vicksburg, Miss., since 1952. **Robert A. Byorum,** formerly project engineering supervisor, has been named assistant chief engineer. **Neil S. Whitaker** has been made production superintendent at Vicksburg. He had been superintendent of the plant's operating division.

PERSONALS

P. W. Wolf, tool pusher for Delta Drilling Co., has been transferred from Renovo to Driftwood, Pa.

W. Vaughn Ischie has been named assistant manager of light-oil operations for Sinclair Refining Co. Formerly operating superintendent of the company's East Chicago refinery, he was granted a year's leave of absence to serve as director of refining in the foreign division of the Petroleum Administration for Defense. He returned to Sinclair early this year as assistant to the refinery's manager in New York.

James N. Gorringe has been named assistant process superintendent at Esso Standard Oil Co.'s Bayonne, N. J., refinery. He had been employe relations manager at Esso's refinery at Baltimore.

J. A. Watson, formerly division superintendent at Midland, Tex., for Lloyd H. Smith, Inc., has been transferred to Graham, Tex., as division production superintendent.

John C. Lane, former head of documentation groups at Gulf Research & Development Co., Pittsburgh, and the Institute of Gas Technology, Chicago, has joined the information services group of Ethyl Corp.'s research and engineering department at Detroit. He will assist in preparing technical publications on Ethyl's research in the automotive-petroleum field. Lane most recently was head of technical information services at Georgia Tech Engineering Experiment Station. For the past 3 years he has prepared a monthly summary of petroleum refining developments.

D. B. Pinnell, Jr., has been appointed field manager of exploration and development by Union Pacific Railroad. His headquarters are in Los Angeles.

W. C. Lenz has been promoted to district production superintendent at Wichita Falls, Tex., by The Texas Co. He succeeds **E. E. Merkt,** who retired August 31 after almost 34 years with the company. Lenz had been assistant district production superintendent since 1947.

Ralph T. McElvenny, formerly a vice president, has been elected president of American Natural Gas Co., replacing **Henry Fink,** who has retired after being president and a director since 1948. Fink will continue as president of Michigan-Wisconsin Pipe Line Co., American Louisiana Pipe Line Co., and American Natural Gas Service Co., and chairman of the board of Michigan Consolidated Gas Co. He also will remain a director of American Natural.

R. R. Von Hagen has been elected president of Lloyd Corp., Ltd., oil-producing firm headquartered at Beverly Hills, Calif., to succeed the late Ralph B. Lloyd. **M. J. Dees,** Ventura, Calif., was elected vice president, replacing Von Hagen.

J. H. Berry has joined Ponder Oils, Ltd., Calgary, Alta., and will serve primarily as managing director of Devon Drilling Co., Ltd., a wholly owned Ponder subsidiary. He formerly was managing director of Continental Supply Co., Ltd., which he organized 4½ years ago after being with Continental Supply Co. 32 years in the United States.

Aubrey (Abe) D. Hill has been named assistant manager of manufacturing, lubricating oils and waxes, for all Sinclair Refining Co. refineries. Since joining Sinclair 30 years ago, Hill has specialized in lubes, with experience in development, design, engineering, and manufacture.

C. H. Marshall has been promoted to technical specialist in the technical-service division of Humble Oil & Refining Co.'s refinery at Baytown, Tex. He will work primarily on problems arising after installation of new process facilities.

J. B. Clapham, formerly principal chemical engineer with Atlantic Refining Co.'s research and development department, has been named secretary of the operating executives' committee and of the operating managers' coordination committee of the company at Philadelphia.

J. M. Keith, formerly field manager at Coleville, Sask., for Royalite Oil Co., Ltd., has been made manager of crude-oil supply and transportation at Calgary, Alta. Other changes by Royalite include **J. A. Harvie,** formerly Edmonton district field manager, to Calgary as general superintendent of production; **D. D. Wright,** production superintendent at Turner Valley, to Coleville as field superintendent; **A. G. Kennedy,** general production foreman

These Officials Will Direct P.E.P.A. in 1954

New officers and directors of the Petroleum Electric Power Association elected at the organization's silver anniversary convention October 5-7 in Kansas City are: (seated) Thomas E. Graham, Oklahoma Gas & Electric Co.; Ned W. Beaudreau, Central Power & Light Co.; Fred B. Clark, Arkansas Power & Light Co., secretary-treasurer; James E. Moody, Southwestern Gas & Electric Co., president; W. L. Pearson, Southwestern Public Service Co., vice president; (standing) Kirby Dawkins, West Texas Utilities Co.; Fred Woerner, Texas Electric Service Co.; Willis Frohock, Kansas City Power & Light Co.; Harvey Cherry, Houston Lighting & Power Co.; U. H. Ohrman, Texas Power & Light Co.; and Tom D. Hoskins, Louisiana Power & Light Co. Not shown is Henry C. LeVois, Gulf State Utilities Co.

PERSONALS

at Edmonton, to Turner Valley as production superintendent; and **Gunnar Haugrud,** district geologist at Edmonton, has been placed in charge of all company activity in that district.

Linden G. Collier has been made shift foreman for General Petroleum Corp.'s refinery at Torrance, Calif. He had been asphalt plant foreman at the company's Vernon, Calif., refinery since 1948.

R. M. Alm, chemist with Standard Oil Co. (Ind.) since 1948, has been appointed group leader in the chemical-products division of the company's research laboratories at Whiting, Ind. He replaces **D. R. Carmody,** who has been made senior patent advisor. Carmody joined Standard in 1950.

R. A. Reinke, superintendent of Continental Oil Black Co. at Westlake, La., since 1951, has been promoted to technical coordinator of Continental Carbon Co., with headquarters at Amarillo. He will direct the company's Amarillo control and technical service laboratory and function as company liaison officer between plant production and sales. Reinke joined the company in 1944 as a chemist at Sunray, Tex.

Charles H. Hewitt, formerly field geologist at Durango, Colo., for Sun Oil Co., is doing graduate work at the University of Michigan at Ann Arbor.

L. L. HENNING

L. L. Henning has been named manager of the Bakersfield refinery of Standard Oil Co. of California, succeeding **M. M. Moore,** who has retired. Henning, former superintendent of the chemical division of the Richmond, Calif., refinery, has been with Standard since 1934. He had been on special assignment since Aust *(The Oil and Gas Journal, August 24, page 97).* Moore joined Standard in 1913 and had been head of the Bakersfield plant for the past 10 years. He began as a chemist in the company's refinery at El Segundo, Calif., and later served in managerial capacities at both El Segundo and Richmond.

Geologists Attend Mid-Continent Meeting

PROMINENT GEOLOGISTS at the Mid-Continent regional meeting of the American Association of Petroleum Geologists in Wichita, October 1-2, were left to right: Graham B. Moody, Standard Oil Co. of California, San Francisco, general chairman of the A.A.P.G. annual convention to be held in St. Louis in 1954; Karl A. Mygdal, Pure Oil Co., Chicago, nominee for president of the A.A.P.G.; W. H. Twenhofel, Orlando, Fla., honorary member of the A.A.P.G.; Edward A. Koester, consultant, Wichita, nominee for president of the A.A.P.G.; and William G. Iversen, Derby Oil Co., Wichita, president of the Kansas Geological Society.

Gene N. Garnett has been promoted by Sun Oil Co. from a trainee to junior production engineer at Delhi, La.

P. D. Mitchell, tool pusher, has joined San Joaquin Drilling Co., Inc., Los Angeles. He formerly was with Rocky Mountain Drilling Co. at Bakersfield, Calif.

Norman C. Miller, formerly geologist at Shreveport for Arkansas Fuel Oil Corp., has joined Ashland Oil & Refining Co. at Oklahoma City as district geologist for Kansas and North Texas.

Dr. Raymond W. McNamee has been appointed manager of research administration for Union Carbide & Carbon Corp. **Dr. Franklin Johnston** has succeeded him as superintendent of Carbide & Carbon Chemicals Co.'s research and development department.

Edward Barrett, geologist for Continental Oil Co., has been promoted to the newly created position of regional research geologist for the company's central region. His headquarters will remain in Oklahoma City. Barrett joined Conoco in 1948 as a geologist at Oklahoma City and has been there since then except for a brief period at Ardmore, Okla.

Samuel A. Sheppard has been named manager of the southern division of Interstate Oil Pipe Line Co., Shreveport. He succeeds **S. R. Simmons,** who has retired after 40 years with Interstate and its predecessors. Sheppard has been with the company 36 years and has been assistant division manager since 1951.

George Kissling, Jr., has resigned as superintendent and vice president of Morgan Petroleum Corp., Bowling Green, Ky., to become an independent producer at Pomeroy, Ohio.

Leland H. Zollars, engineer with Magnolia Petroleum Co., has been transferred from Sturgis, S. D., to Jackson, Tenn.

George B. Hamilton, formerly chief chemist at Venezuela Gulf Refining Co.'s refinery at Puerto La Cruz, Venezuela, has returned to New York as a lubricant technical service engineer with The Texas Co. He had been in Venezuela for 3½ years on a loan basis.

DEATHS

Harold D. McNee, 45, tool pusher for Shell Oil Co., died recently at Ojai, Calif.

Arthur H. Gore, 69, died recently at Long Beach, Calif. He had been a pipeline superintendent for Richfield Oil Co. for 31 years.

H. N. (Scoop) Nelson, 43, was killed recently in an automobile accident in Moorhead, Minn. He was assistant sales manager of Gar Wood Industries' Findlay division.

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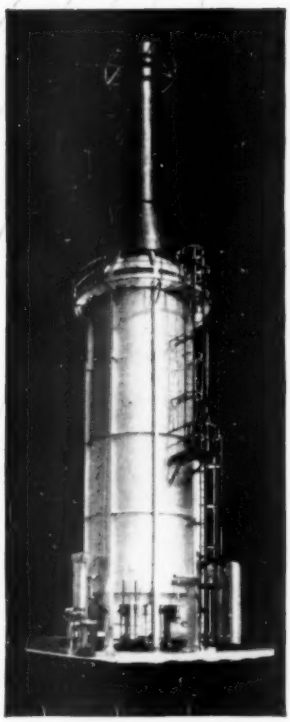

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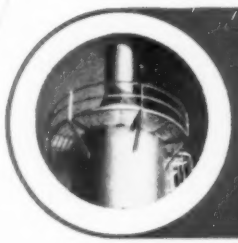

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New Catalytic Reforming Process

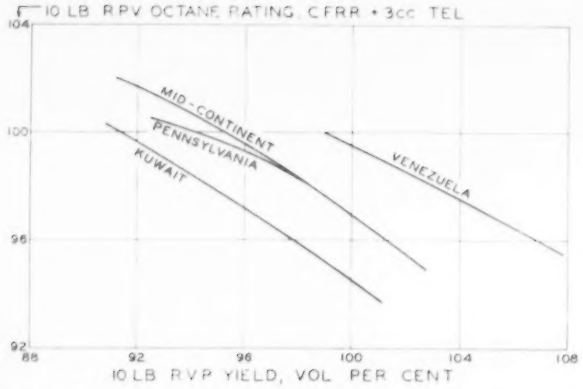


Fig. 1—Ten-pound R.v.p. yield-octane relationships, continuous processing at 500 psig.

. . . employs catalyst which can be regenerated in place with diluted air

by J. W. Teter, B. T. Borgerson, and L. H. Beckberger

THE ever-increasing demand for higher-octane motor gasoline and aromatic hydrocarbons for chemicals has emphasized the need for the development of highly efficient yet flexible catalytic reforming processes. Sinclair Research Laboratories, Inc., and Baker & Co., Inc., have developed a new platinum reforming catalyst, RD-150, which possesses two major advantages: (1) a high ratio of paraffin cyclization activity to hydrocracking activity, and (2) an ability to be regenerated with diluted air.

Flexibility of process is such that operation may be conducted with or without regeneration during processing.

The improved paraffin cyclization activity makes possible the efficient conversion of paraffins to aromatics. Therefore a superior yield-octane relationship at high octane levels and greater aromatics yield are achieved. In addition this characteristic makes possible a superior yield-octane relationship for paraffinic naphthas which extends the usefulness of this catalyst to a wide variety of feed stocks.

The ability of the catalyst to be regenerated provides the refiner with a means of extending the life at operating conditions more favorable, from an equilibrium standpoint, for producing a superior yield-octane and improving the aromatics yield. In general, these two major advantages provide the refiner with a catalyst whose performance gives a wide choice of plant designs to meet present and future markets for high-octane gasoline and aromatics with greatly improved catalyst selectivity and life.

Authors are with Sinclair Research Laboratories, Inc., Harvey, Ill. Paper presented at regional W.P.R.A. meeting at Casper, Wyo., September 25, 1953.

First unit . . . Sinclair Refining Co. has announced the incorporation of this new catalyst in the design and construction of a 16,000-bbl. per day catalytic reformer at its Marcus Hook, Pa., refinery.[1,2] C. F. Braun & Co. is contractor for this unit which is scheduled for initial operation in the summer of 1954.

The superiority of catalytic reforming over thermal reforming is a result of the catalyst's ability to isomerize and dehydrogenate naphthenes to aromatics and isomerize straight-chain paraffins to higher-octane isomers with a minimum production of light gases and high-molecular-weight compounds. Not only does Sinclair-Baker catalyst RD-150 achieve these desired results, but in addition it has the ability to obtain significant conversion of paraffins to aromatics by dehydrocyclization. This advantage allows the production of high-octane reformates from low naphthene content naphthas without the undesirable conversion of paraffins to light gases.

Simple regeneration . . . Because this new catalyst has a high initial activity which declines slowly during continuous processing, its use is attractive and competitive with existing continuous catalytic reforming processes. In addition, the catalyst can be restored to near initial activity by a simple regeneration in place with diluted air. This feature of the catalyst allows considerable flexibility in choice of operating conditions and therefore plant design to attain a more economical catalytic reforming process. Because of the catalyst's resistance to sulfur and metal poisoning, pretreating of the feed stock is unnecessary up to moderate sulfur levels. For high-sulfur stocks

TABLE 1—FEED-STOCK CHARACTERISTICS

Crude source—	Mid-Continent	Venezuela	Kuwait	Pennsylvania
Gravity, °A.P.I.	54.1	48.6	54.0	57.4
I.b.p., °F.	236	252	240	214
10 per cent	257	273	283	232
50 per cent	291	306	310	260
90 per cent	341	358	337	308
End point	373	385	355	336
Naphthenes, per cent	43.2	43.0	19.4	27.7
Aromatics, per cent	7.7	22.9	14.7	11.1
Paraffins, per cent	48.8	33.8	65.1	58.8
Sulfur, weight per cent	0.021	0.032	0.087	0.072
Octanes:				
Research, neat	36.5	51.0	29.6	43.4
Research + 3.0 cc. TEL	61.0	73.0	52.5	65.5

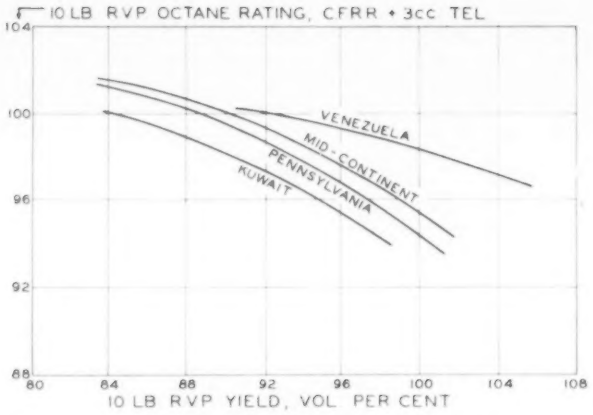


Fig. 2—Ten-pound R.v.p. yield-leaded octane relationships, continuous processing at 500 psig.

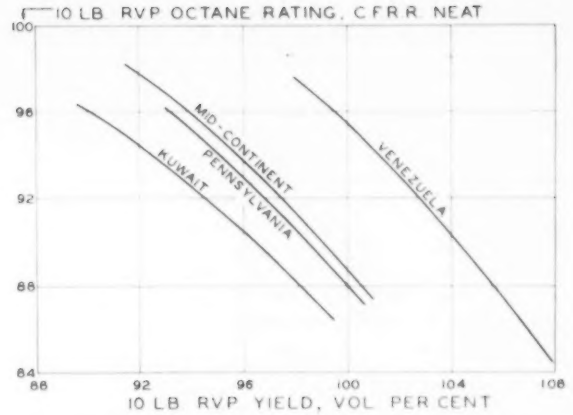


Fig. 3—Ten-pound R.v.p. yield-octane relationships, regenerative processing at 200 psig.

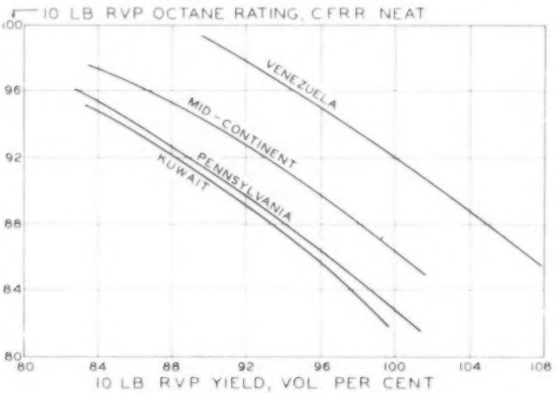


Fig. 4—Ten-pound R.v.p. yield-leaded octane relationships, regenerative processing at 200 psig.

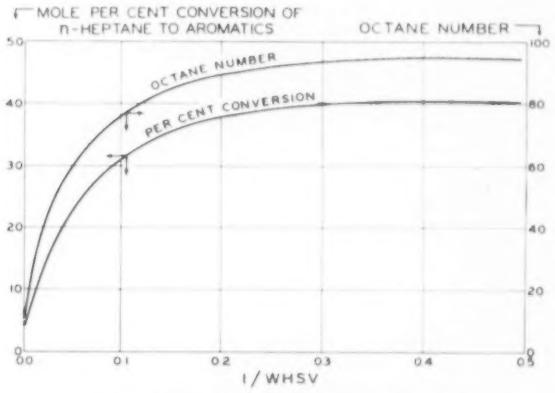


Fig. 5—Dehydrocyclization of n-heptane 200 psig., 925° F.

naphtha desulfurization or removal of hydrogen sulfide from the recycle gas may be required.

Design Alternates

To illustrate the possible flexibility in design, two alternates are considered.

Continuous operation . . . When processing a naphtha for the production of 80 to 90 research neat octane at operating pressures ranging from 200 to 750 psi., continuous catalytic reforming, such as practiced in the industry today, may be employed. This design may include simple facilities to regenerate the catalyst at the conclusion of each long processing period. In addition to improved yields, with paraffinic as well as naphthenic feed stocks, long periods of time between catalyst changes make this processing scheme attractive to the refiner.

Regenerative operation . . . When operating to produce reformate with research neat octanes above 90 it may be desirable to employ a regenerative-type operation. This choice depends to some extent upon the paraffin content of the feed stock. The regenerative design permits processing at operating conditions consistent with optimum reformate yields at minimum operating and fixed costs. As distinguished from continuous operation, the regenerative scheme of processing embodies facilities to regenerate a portion of the catalyst without interrupting the processing cycle.

Motor Gasoline Production

The characteristics of a variety of feed stocks with which RD-150 catalyst has demonstrated superior performance are shown in Table 1. Figs. 1 and 2 show the high yields of finished 10-lb. R.v.p. gasoline obtainable with 500-psig. continuous operation on both neat and leaded with 3 cc. of TEL bases. Similar yield-octane curves for 200-psig. regenerative processing are shown in Figs. 3 and 4. Typical product distributions for the 500-psig. continuous operation at 85 and 95 research neat octane are shown in Table 2. A similar tabulation of product yields for the 200-psig. regenerative operation is shown in Table 3.

Reformate yield . . . For a given feed, an improvement in 10-lb. R.v.p. yield is obtained with the 200-psig. as compared to 500-psig. operation for the range of 85 to 95 research neat octanes which are shown in Figs. 1 to 4 inclusive. The improvement in yield obtainable by operation at lower pressure increases with increase in paraffin content of feed and with increase in reformate octane. Because the Sinclair-Baker catalyst may be regenerated, this improved yield can be acquired thus illustrating the primary advantage to be gained by using the regenerability feature of the catalyst.

In all cases outside butane may be used to produce 10-lb. R.v.p. reformate. Low C_3-and-lighter gas yields also reflect the selectivity of the RD-150 catalyst. The high net hydrogen production also given in Tables 2 and 3 represents important potential values for desulfurization, hydrorefining, and petrochemical processes.

Production of Aromatics

The excellent yield-octane pattern for a wide variety of feeds, as shown in the previous section is due, to a large

extent, to the ability of the catalyst to efficiently produce large quantities of aromatics from both naphthenes and paraffins. The ability of the RD-150 catalyst to convert paraffins to aromatics is illustrated in Fig. 5. Normal heptane was converted to aromatics at moderate space velocities to the extent of greater than 40 mole per cent, producing a 95 research neat octane reformate. Similarly, with normal octane at lower pressures 66 mole per cent conversion to aromatics was attained with a yield of 64 volume per cent pentane and heavier reformate of greater than 100 research neat octane. Table 4 shows the benefits to be derived from the catalyst because of its remarkable paraffin cyclization activity when producing aromatics from C_6, C_7, and C_8 boiling-range fractions. Also typical feed-stock characteristics and aromatic yields are given for these fractions which were prepared from a Venezuela, a California, and a Mid-Continent crude.

Dehydrocyclization of paraffins to toluene and xylenes range from 10 to 25 per cent even though calculated on the basis that the naphthenes which are converted dehydrogenate to form aromatics only. No doubt some naphthenes are hydrocracked so the paraffin dehydrocyclization is somewhat greater than calculated. In the production of benzene from the C_6 fraction the catalyst demonstrates a remarkable five-membered-ring naphthene isomerization activity. Further evidence for this type of activity is shown in Table 5 in which excellent yields of aromatics were obtained when treating a C_7 fraction containing predominantly dimethyl cyclopentane.

TABLE 2—CONTINUOUS OPERATION AT 500 PSIG.

Feed stocks, crude source	Mid-Continent		Venezuela		Kuwait		Pennsylvania	
Reformate yields:								
C_5+, volume per cent	86.8	79.0	91.7	85.8	85.6	75.6	85.0	74.8
10-lb. R.v.p., vol. per cent	99.8	89.4	107.3	97.5	96.4	84.4	97.2	84.4
Octanes, research:								
C_5+, neat	85.0	95.0	85.0	95.0	85.0	95.0	85.0	95.0
C_5+, + 3 cc. TEL	94.6	99.6	95.5	99.5	94.2	99.7	96.0	99.7
10-lb. R.v.p., neat	86.0	94.6	86.0	94.6	85.8	94.3	85.8	94.7
10-lb. R.v.p. + 3 cc. TEL	95.3	99.8	97.2	99.7	95.1	99.9	96.5	99.9
Butanes, volume per cent:								
Produced	4.4	6.4	2.0	4.2	4.9	8.5	5.5	8.9
Outside, to 10-lb. R.v.p.	8.6	4.0	13.6	9.5	5.9	0.3	6.7	0.7
Light gases:								
C_1, weight per cent	1.0	1.5	0.5	1.2	1.3	2.2	1.2	1.9
C_2, weight per cent	2.4	3.0	0.8	1.9	2.4	4.5	1.9	3.0
C_3, weight per cent	4.5	6.5	1.2	3.1	3.5	7.2	3.7	6.7
Hydrogen, cu. ft. per bbl.	550	740	725	683	510	470	685	590
Reformate, C_5+:								
Gravity, °A.P.I.	48.0	46.7	43.1	42.1	48.9	45.5	47.4	46.6
I.b.p., °F.	141	138	158	148			138	134
10 per cent	220	210	246	227			208	191
50 per cent	286	281	298	291			261	256
90 per cent	340	352	362	363			323	328
End point	414	420	432	440			378	387
Sulfur, weight per cent	0.004	0.004	0.009	0.005	0.006	0.006	0.005	0.005

TABLE 3—REGENERATIVE OPERATION AT 200 PSIG.

Feed stocks, crude source	Mid-Continent		Venezuela		Kuwait		Pennsylvania	
Reformate yields:								
C_5+, volume per cent	87.8	83.3	91.8	86.8	86.8	81.2	87.8	82.2
10-lb. R.v.p., vol. per cent	102.0	94.8	107.5	100.7	100.0	92.8	101.5	94.3
Octanes, research:								
C_5+, neat	85.0	95.0	85.0	95.0	85.0	95.0	85.0	95.0
C_5+, + 3 cc. TEL	94.4	99.7	95.2	99.0	93.5	99.2	95.6	99.2
10-lb. R.v.p., neat	85.8	94.6	86.1	94.6	85.9	94.7	86.0	94.6
10-lb. R.v.p. + 3 cc. TEL	95.3	99.9	96.2	99.4	94.5	99.4	96.4	99.4
Butanes, volume per cent:								
Produced	2.8	4.2	1.5	2.9	3.2	4.9	2.2	4.9
Outside, to 10-lb. R.v.p.	9.8	7.9	14.2	11.0	10.0	6.7	11.5	7.2
Light gases:								
C_1, weight per cent	0.7	0.9	0.5	0.8	0.4	1.1	0.6	1.0
C_2, weight per cent	1.8	2.1	0.6	1.3	1.3	2.4	1.1	2.1
C_3, weight per cent	2.6	3.6	0.8	2.0	2.1	3.4	1.9	3.6
Hydrogen, cu. ft. per bbl.	880	1,150	930	830	730	875	910	1,150
Reformate, C_5+:								
Gravity, °A.P.I.	44.9	42.3	41.9	39.6	50.9		45.2	43.7
I.b.p., °F.	130	126	190	150				139
10 per cent	209	207	252	242	177			200
50 per cent	285	288	303	298	270			258
90 per cent	360	363	370	378	362			343
End point	448	457	437	455	419			390
Sulfur, weight per cent	0.005	0.005	0.005	0.005	0.004	0.004	0.006	0.037

Catalyst Life

Since RD-150 employs platinum as its active agent, it is of course necessary that it possess excellent resistance to permanent deactivation in order to allow economic application of the process. The catalyst meets this requirement by combining high initial activity, resistance to aging during processing, and resistance to poisoning with regenerability. Sulfur, nitrogen, and water as they normally occur in most feed stocks are not severe poisons to this catalyst. If these materials are present in unusually large quantities or if high severity operations are desired, the temporary poisoning effect can be avoided by preparation of dry feed stock and simple recycle gas treating to take advantage of the full potential life of this catalyst. Processing with clean feed stock or regeneration will remove the effect of processing with large quantities of these temporary poisons.

Extensive investigations have indicated that the presence of arsenic in the feed has little effect if any on the process. Catalyst lives will vary over a wide range depending upon the nature of the feed stock and operating conditions. In general, reformate production varies from 40 to over 200 bbl. per pound of catalyst.

Description of Processing

A simplified flow diagram of the catalytic reforming process in continuous operation is shown in Fig. 6. During processing the naphtha fresh feed is combined with recycle gas and fed to the preheater. Preheated vapors pass in series flow through three or more fixed-bed reactors designed to minimize thermal effects. The vapors pass downflow in these adiabatic reactors. Because of the over-all endothermic nature of the reforming reactions, interheaters are provided between re-

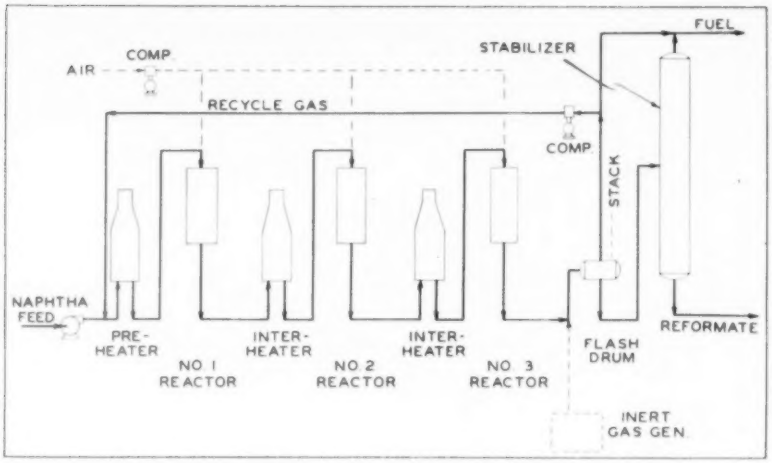


Fig. 6—Simplified flow diagram, continuous catalytic reforming.

actors to maintain process temperatures. The effluent from the last reactor is cooled by exchange to near atmospheric temperatures before entering the flash drum. The hydrogen-rich gas leaving the flash drum is split in two streams. The net flash gas is released to a fuel line or sent to an absorber for recovery of light hydrocarbons. The remainder of the hydrogen-rich gas is compressed and recycled with fresh naphtha feed. The liquid leaving the flash drum is taken to a stabilizer for separation of light hydrocarbons from the finished reformate.

Processing conditions . . . These are fixed by consideration of the quality and yield of desired products consistent with economic operating costs, capital expenditure, and available feed stocks. In general the preferred range of operating conditions are 200-750 psig., 825°-950° F., and based on fresh feed, a 1 to 5 weight hourly space velocity and 3 to 10 molal recycle gas ratio.

How to regenerate . . . The dotted lines in Fig. 6 show one proposed method for catalyst regeneration. With continuous processing, it may be desirable to regenerate the catalyst once every 3 to 6 months to achieve maximum productivity. Regeneration is started by depressuring and purging the system with inert gas from a small generator. After purging, the system is filled with inert gas to a low pressure, the gas generator is stopped, and the recycle compressor is placed in operation. When regeneration temperatures are reached a controlled amount of air is supplied to each reactor to complete combustion of the carbonaceous material which had fouled the catalyst. After regeneration the unit is depressured, purged, and either hydrogen or process recycle gas circulation is established at somewhat lower than the usual operating pressure. Normal operating pressures are restored by resumption of naphtha processing at mild conditions.

How long a cycle? . . . The length of the naphtha processing cycle is dependent upon a number of variables. Low operating pressure, low naphthene-content feed stock, high space velocities, low recycle-gas ratios, the production of high-octane reformates, and increased number of regenerations tend to decrease the length of the naphtha processing cycle. With paraffinic naphtha and the requirement of above 90 research neat octane reformate or high aromatic production it may be desirable to design a unit for the regenerative-type operation. Low-pressure operation offers the advantage of improved yields when considering the regenerative type of operation. Design for this operation is essentially the same as that for the continuous process de-

(Continued on page 140)

TABLE 4—AROMATICS PRODUCTION

Feed stock, crude source—	Venezuela			California			Mid-Cont.
Fractions—	C_6	C_7	C_8	C_6	C_7	C_8	C_6
Gravity, °A.P.I.	70.4	57.2	50.2	55.7	59.1	55.4	58.1
I.b.p., °F.	148	190	248	161	192	245	162
10 per cent	157	204	254	163	194	248	165
50 per cent	164	214	263	165	198	251	166
90 per cent	185	227	275	169	207	256	170
End point	248	265	295	195	215	266	180
Naphthenes, volume per cent:							
Methyl cyclopentane				56.0			32.4
Cyclohexane				28.2			37.9
Dimethyl cyclopentane				3.6			0.4
Total	20.1	32.4	31.4	87.8	62.5	59.0	70.7
Aromatics	8.4	18.9	21.5	2.6	3.7	4.8	3.6
Paraffins	71.5	48.7	47.1	9.6	33.8	36.2	25.7
Yields on feed:							
Benzene, volume per cent feed	13.7	1.5	0.5	57.0	0.8	0.3	50.0
Toluene, volume per cent feed	8.2	28.2	4.0	2.7	46.2	1.7	1.6
Xylenes, volume per cent feed		15.2	33.4		8.6	50.4	
C_9+ aromatics		2.4	18.3		1.0	7.6	
Per cent paraffin cyclization*		10	24		25	19	
C_4, volume per cent	10.3	8.2	7.6	5.4	8.4	4.9	12.2
$C_1 + C_2 + C_3$, weight per cent	8.6	5.2	5.7	4.2	5.8	2.2	13.1
Hydrogen, cu. ft. per bbl. feed	410	1,000	1,360	2,110	2,000	1,350	1,500

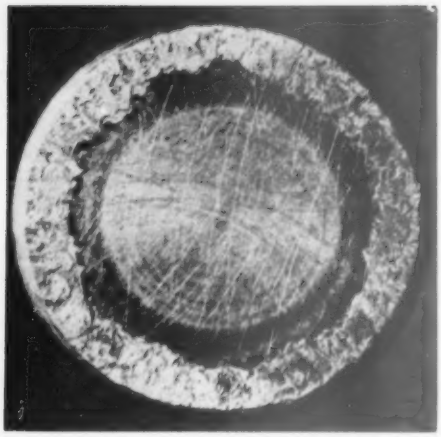
*Minimum cyclization, since it assumes that the naphthenes are converted to aromatics only.

TABLE 5—C_7 CUT NAPHTHENE ISOMERIZATION
(Conditions: 900° F., 300 psig.)

	Volume per cent	
	Feed-Stock analysis	Product analysis, fresh feed
Paraffins	37.0	31.2
Olefins	0.0	0.8
Naphthenes	63.0	7.3
Aromatics	0.0	44.4
Naphthene composition, per cent:		
Cyclohexane		2.3
1,1-dimethyl cyclopentane		12.9
1,2-dimethyl cyclopentane		45.0
1,3-dimethyl cyclopentane		39.8
Total		100.0

TABLE 6—BREAKDOWN OF TYPICAL OPERATING COSTS

	Cents per bbl.
Operating labor	1.5
Supervision	0.1
Repair labor	5.3
Repair material	3.5
Payroll burden	1.4
Operating supplies, miscellaneous	0.3
Utilities:	
Steam	5.1
Power	0.6
Water	1.3
Fuel	1.8
Total direct operating cost (excl. catalyst)	20.9



These rollers from a bearing of a rig-compound unit show damage as a result of thrust loading in the absence of sufficient lubricant. Notice the smearing of the ends.

Rig-compound maintenance

Proper Alignment, Cleanliness, Lubrication— Plus Horse Sense = Good Service

by E. L. Phillips, Jr.

NO one phase of preventive maintenance, although good in itself, can alone prevent premature failure in compounding equipment. Rather, lubrication, proper alignment, and all the other factors must be taken together to insure continuous service.

Most important of these factors is correct alignment, since the most frequent source of trouble is misalignment, usually between engine and compound shaft. This condition results in premature failure of the flexible coupling connecting the two elements or the adjacent bearings, or both.

It is common experience that shafts may be perfectly aligned by dial indication at the time of rigup, only to become badly misaligned during the course of drilling. Uneven settling of the substructure is responsible and can only be compensated for by occasional checks of alignment and shimming at the proper points. It is of equal importance that all skid elements be rigid and capable of resisting any tendency to flex with load application.

Flexible couplings are, of course, capable of absorbing considerable misalignment. In the case of pneumatic engine clutches, however, capacity for misalignment does not exist. The expanding rubber tube locks the friction shoes onto the drum and forms a rather rigid connection. Any misalignment is transmitted to the adjacent bearings with eventual damage resulting.

There are other types of connections coming into use. One of these is called a rubber block drive and consists of a multitoothed spider wheel engaging a driving ring. The spider teeth are encased in neoprene sleeves which are the only contact with the driving-ring teeth. This connection is quite flexible and requires no lubrication.

Another coupling contains neoprene "biscuits" with pins which connect the two halves. The shock and misalignment are absorbed by the biscuits. This coupling likewise needs no lubrication.

The gear-tooth coupling, commonly known as Fast's coupling requires lubrication in the form of oil. Excessive misalignment increases lubricant consumption, so the oil level should be checked at least once a week.

Lubrication

Bearing lubrication is the most common maintenance problem on any drilling rig, and the usual procedure is to lubricate every bearing every 8 hours. The fact is that 95 per cent of the bearings would actually last longer if lubricated every 8 days.

What is not commonly understood is that a ball or roller bearing actually operates best with a very thin film of grease or oil between the rollers and the races. An excess of lubricant results in a churning action which in turn results in heating and breaking down the lubricant.

While the 8-hour lubrication schedule is based on an effort to see that the bearings are maintained regularly, it would probably pay the operator to arrange a lubrication schedule calling for less frequent but still regular greasing. We are speaking, of course, of ball and regular bearings. Bronze bushings require much more frequent lubrication.

Oil better than grease . . . By and large any drilling rig bearing will have a longer life if lubricated with oil rather than with grease. This statement should be qualified to say that oil properly selected and properly introduced into the bearing promotes a longer life than ordinary grease-gun lubrication.

There are two general means of introducing oil into the bearing. The first is by flooding or agitation, in which the bearing is either partially submerged in the lubricant or some other rotating member slings the oil into

Author is with Vance Supply Co., Odessa, Tex.

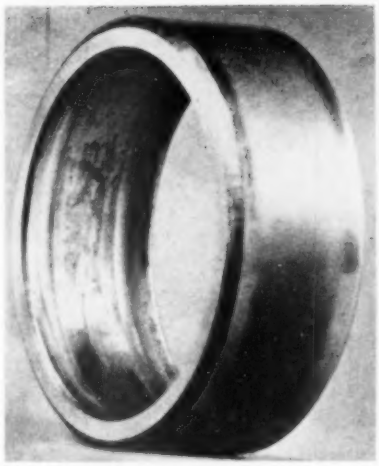
the bearings. Either way has inherent disadvantages. In the case of the submerged bearing the oil level is quite critical, excessive oil causing churning and breakdown of the oil, and insufficient oil resulting in no lubrication at all.

The second means of introducing oil into the bearings is by pumping or force feeding. This is by far to be preferred. Most modern draw works are so lubricated and some compounding transmissions likewise.

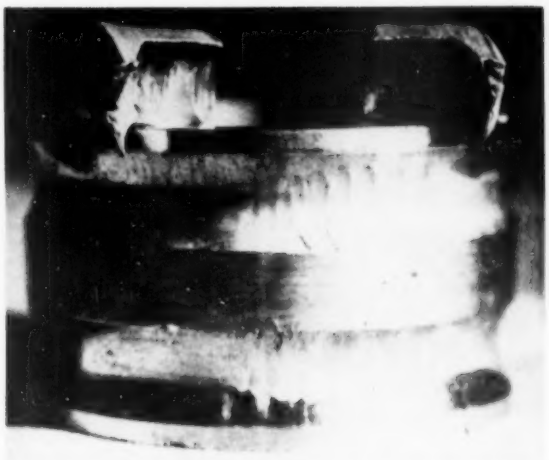
Force-fed lubrication achieves a threefold purpose: (1) The bearing is supplied with fresh oil constantly. (2) Any foreign matter in the bearing is washed out. (3) The bearing is cooled by the oil circulation. Inlet and outlet ports are so designed that the proper oil level is maintained in the bearing proper.

It is a conservative statement that force-fed oil-lubricated bearings outlast grease-lubricated bearings on the same application two to one.

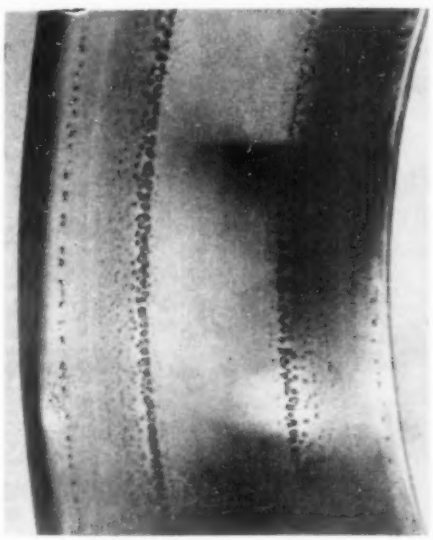
There is one danger in connection with oil lubrication. Dirt and other foreign matter can find their way into the oil reservoir. The pump screen and the reservoir should be cleaned regularly. A plugged oil line can be disastrous.



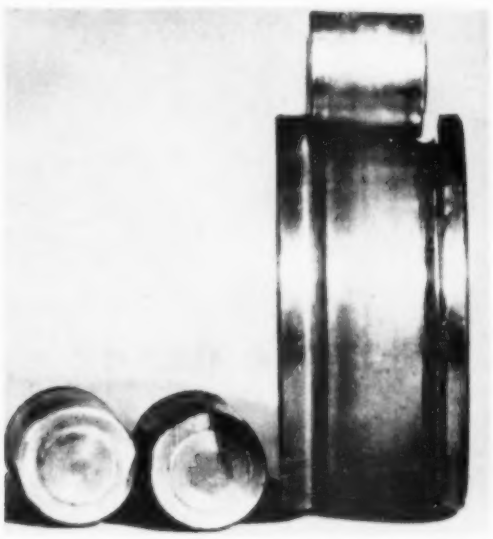
Foreign matter in the bearing during operation caused this wear.



This bearing was subjected to vibration in the presence of foreign matter as the resultant fluting and wear show.



Rust in an outer bearing race caused by an unsuitable lubricant.



Inner race and rollers showing wear from lack of lubrication. (Photographs courtesy SKF Industries, Inc.)

Selecting proper oil . . . Selection of the proper oil for bearing lubrication often poses a problem. Ordinarily on a rig compound the chain and bearings are lubricated by the same oil. At the loads and speeds encountered on this application the bearing actually requires a lighter oil than does the roller chain. It is therefore necessary to compromise between the two requirements. S.A.E. 30 motor oil is commonly used on 900 to 1,000-r.p.m. applications.

Where the compound shafts are carried in externally mounted pedestal bearings it is usually more convenient to lubricate with grease. All bearing manufacturers agree that oil is a better lubricant, but on a drilling rig the machine elements must be made portable and capable of being rigged up in a minimum of time. It would be impractical to circulate oil through pedestal bearings on conventionally designed compounds now in use.

We therefore must accept the fact that grease lubrication of roller bearings is here to stay. Proper selection of grease to be used and application of the proper amount at the proper interval will result in satisfactory lubrication.

Bearing greases . . . Most bearing greases are a mixture of soap and lubricating oil. The soap merely keeps the oil in suspension. When the moving parts of the bearing come in contact with the grease a small amount of oil will cling to the surface. Oil is therefore removed from the grease near the rotating parts. This oil is gradually broken down by oxidation or lost by centrifugal force or evaporation.

New grease added to the bearing housing forces the soap residue out, replacing it with fresh lubricant.

The grease specifications recommended by the Annular Bearing Engineering Committee for bearing sizes and speeds encountered in rig compounds are as follows:

Specification ABEC-1

Greases to be free from dirt, abrasive matter, fillers, excessive amounts of moisture, and free acid or free alkali.

(Continued on page 151)

we have never owned an oil well

Certainly oil production is indispensable to our business, nevertheless, Universal has never owned an oil well . . . . never produced any oil . . . never commercially refined, transported or marketed any petroleum products.

Our business . . . . from its very infancy . . . . has been confined to the development and commercial application of petroleum refining facilities . . . . the methods and techniques that have permitted the petroleum refiner

to produce maximum quantities of quality products to meet the demands of his markets.

That we have been successful in this effort is best evidenced by the hundreds of processing units designed by our company, and which are daily serving refineries all over the world.

Universal will never knowingly compete with a petroleum refiner in any phase of his production, refining or marketing business.

In our lifetime we could have acquired many oil wells and perhaps a refinery or two, but we've stuck to our task of helping the refiner . . . . giving him the kind of assistance that he must have if he is to realize a profitable return on his investment.

We Have Never Owned An Oil Well, is a fact that can be further emphasized by saying . . . . we never intend to. We simply won't compete with those we serve.

UNIVERSAL OIL PRODUCTS COMPANY

UOP

30 ALGONQUIN ROAD, DES PLAINES, ILL., U.S.A.

Laboratories: RIVERSIDE, ILLINOIS

Universal Service Protects Your Investment

Pump station and terminal facilities are concentrated on a narrow strip of land between Standard's refinery on one side and the creek and railroad yard on the other.

In-Line Layout at Multipurpose Terminal

Indiana Standard's pump-station facilities located on man-made shelf

by Sam L. Jackson

THE terminal and pump station of Standard Oil Co. (Indiana) at Sugar Creek on the outskirts of Kansas City, Mo., were designed to receive refined products from two refineries for delivery into two pipe lines, both terminating in Iowa—one at Sioux City and the other at Dubuque.

From Neodesha, Kans., refinery, products arrive through a 140-mile, 8-in. line.

The Sugar Creek station and terminal is immediately adjacent to the company's refinery from which products are received through fairly short piping.

A significant feature is the unusual in-line arrangement of facilities which has been dictated by the restrictions of the site. The entire pipe-line installation is located on a man-made shelf. Major structures are supported on piling because of the poor bearing qualities of the soil.

Station construction . . . The construction of the Sugar Creek station was carried out in two phases. The first was the construction of the main station building and the associated facilities to provide increased capacity on the Sugar Creek-Sioux Falls line. These facilities were completed and placed into operation on July 16, 1952.

Operation of this new station permitted the dismantling of the original station which was no longer adequate to meet the increased line capacity. The original station facilties were then relocated at Neodesha to move products from Neodesha to Sugar Creek.

The second phase of this project included the construction of a dehydration plant and station facilities for transportation from Sugar Creek to Dubuque. These facilities were completed and placed into operation in March 1953.

Receiving manifolds and booster pumps. The station receiving manifold is designed to receive three different products simultaneously from either Sugar Creek refinery tankage or from the Neodesha refinery, via the Neodesha-Sugar Creek line.

The peculiar conditions for handling deliveries from both the Neodesha refinery pipe line and the off-site piping of the Sugar Creek refinery presented special problems. A small batching tank was installed adjacent to the pump-station site to facilitate handling interfaces from the Neodesha line.

While a different product is being tendered to each outgoing line, a third can be received from the Neodesha refinery and directed into Sugar Creek refinery tankage for temporary storage.

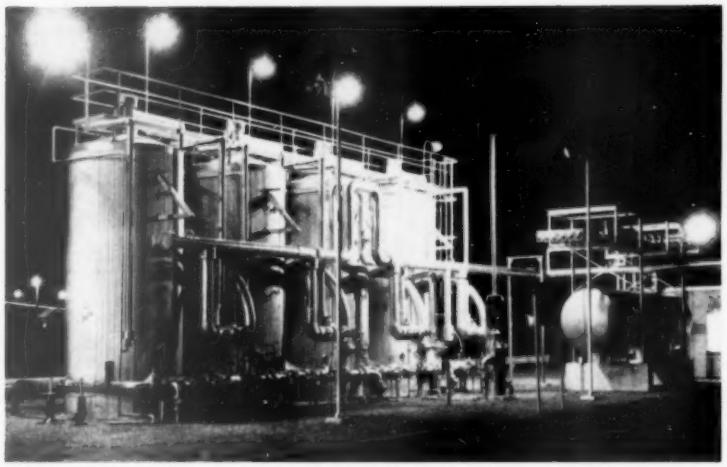
Each system contains a pair of vertical turbine booster pumps to initiate the movement of products through the station.

Dehydration Plant

The Sugar Creek-Dubuque line is protected from internal corrosion by dehydrating all products tendered to the line. Products tendered to the Sugar - Creek - Dubuque line must be dehydrated, since this line is connected to the Whiting-Dubuque and Dubuque-Moorhead lines, which in turn transport dehydrated products from the Whiting refinery.

Product from the booster pumps is directed through the water separators prior to entering the dehydration towers. There are three water separators, one of which is a standby. Maximum flow of each is 25,000 bbl. per day. The purpose of the water separator is to coalesce and remove free water present in the product as well as to filter out any large particles of sediment.

On leaving the separators, the product enters the bottom of the dehydration tower and flows upward through an alumina desiccant bed. Dehydration is effected to the point that no water will precipitate out of the product as it reaches the lowest temperature to



Dehydration plant at pump station for processing gasoline shipped through the new line to Dubuque, Iowa.

Map of Standard Oil Co. (Indiana) product pipe lines.

be encountered in moving through the pipe line. Volume of each tower is 101 bbl., with 18,000 lb. of alumina and 7,500 lb. of gravel as normal charge. Maximum throughput is 25,000 bbl. per day.

On leaving the dehydrators, product is routed to station meters and then to the main-line pumps.

In normal operation, two towers are on stream while two are being regenerated. When the desiccant in the on-stream towers has absorbed moisture to the point where it can no longer effectively dehydrate the product, the product is routed to fresh towers, and the spent towers are taken off stream and regenerated.

The product is first drained from the spent towers to the station sump pump and pumped back into the main stream.

Regeneration steps . . . Regeneration of the water-laden desiccant is accomplished in the following sequence:

1. Natural gas is heated to 500° F. in a gas-fired heater and is then admitted into the top of the towers.

2. The hot gas heats the desiccant, vaporizing the moisture and any product retained in the desiccant.

3. The mixture of gas, water vapor, and product vapor is then routed to a series of heat exchangers. The cooling medium used through the heat exchanger is the main-line product. Heat exchanged is 1,515,000 B.t.u. per hour.

4. The water and product vapors mixed with the natural gas carrier are condensed to the liquid state.

5. On leaving the heat exchangers, the above mixture of natural gas, water (liquid), and product (liquid) is directed through a gas-liquid separator. The liquids, water, and product are trapped out and collected in the recovery tank, while the natural gas continues its path over to the recycling compressor.

6. The gas is then compressed again to recover any pressure drop sustained in its cycle through the regeneration piping and equipment.

Gas is recycled in the above manner until all portions of the desiccant bed are brought up to a temperature of 350° F. When this temperature has been reached, the gas-fired heater is turned off and gas continues to be recycled until the desiccant bed temperatures are brought down to 125° F. The towers are now completely regenerated and ready for on-stream use.

Water collected in the recovery tank is periodically drained to a sewer, while the product collected is periodically disposed of for reprocessing.

The regeneration system has been

(Continued on page 154)

THE AUTHOR

Sam L. Jackson is manager of the products pipe line department of Standard Oil Co. (Indiana). He is a native of Durant, Okla., and attended Southeastern State College at Durant and University of Oklahoma. Jackson started to work as an engineer's helper with Sinclair Pipe Line Co. in 1928. He served in various engineering capacities with Stanolind Pipe Line Co., later Service Pipe Line Co., and was assistant chief engineer for Service when he joined Standard in March 1951 as assistant manager of its products pipe line department. He became manager in November 1951 and in this capacity has supervised the company's pipe-line-expansion program.

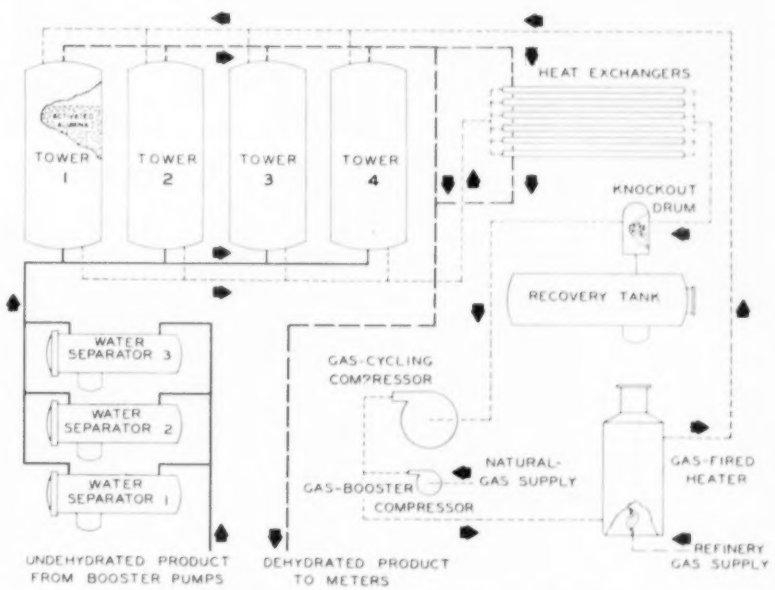
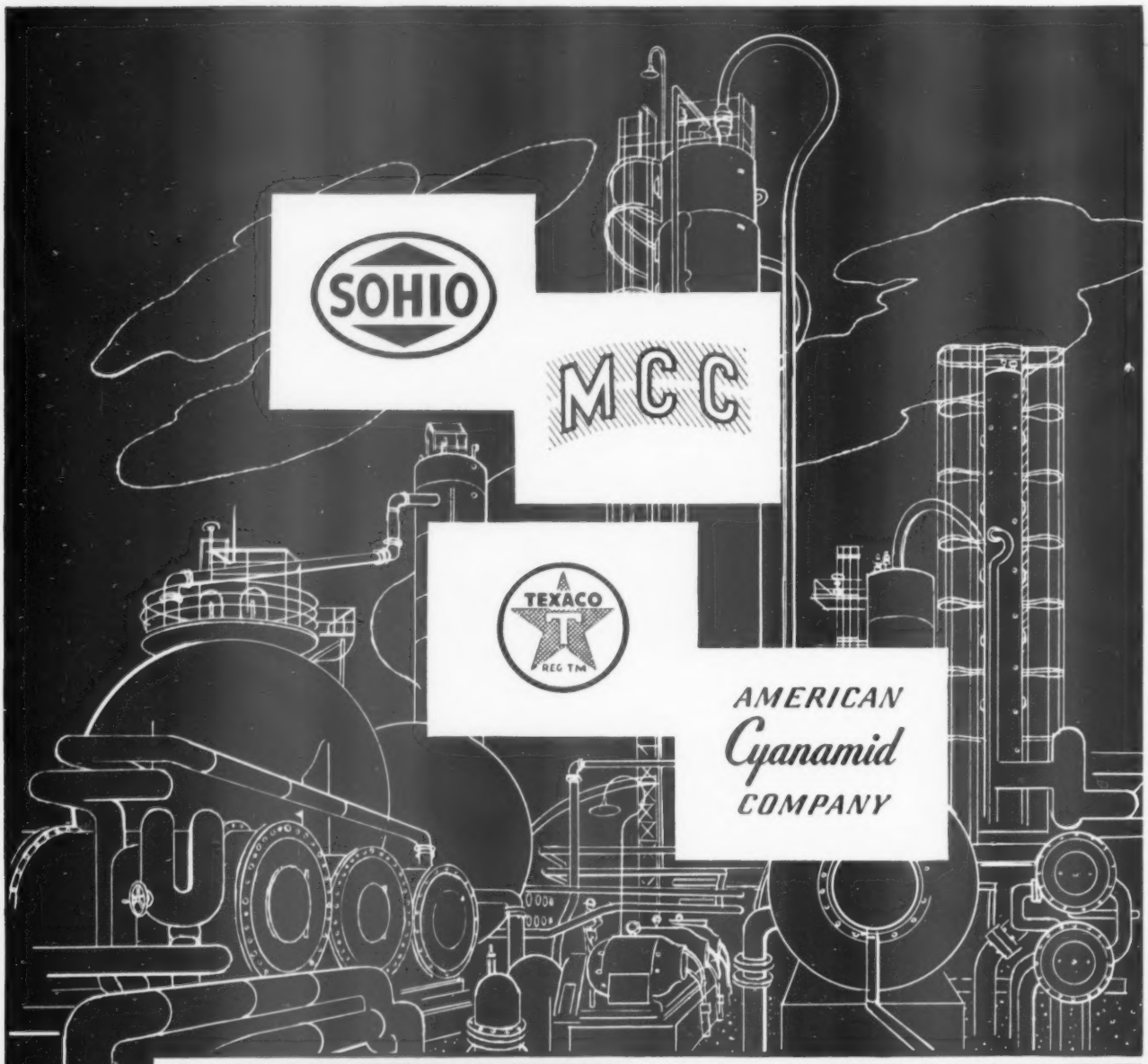


Diagram of dehydration plant at Sugar Creek Station.



This Westinghouse high-voltage switchgear automatically and rapidly clears trouble at Standard Oil's Lima Refinery. If there's a momentary outage, the load is reapplied in segments.

Westinghouse control centers minimize maintenance problems and give Mississippi Chemical the advantages of grouped control. Individual units can be installed or removed with file-drawer efficiency.

Petroleum and chemical companies confirm:

Westinghouse equipment provides dependability

Our engineers help you get dependability by combining Westinghouse electrical equipment with creative system planning. Here's proof.

Sohio's Lima Refinery got power dependability without paying extra for stand-by capacity. Westinghouse engineers helped develop a power system which provides a fast restoration of service after interruptions. Westinghouse supplied a control system that automatically and rapidly clears trouble. This system successfully handled twelve power interruptions during the first nine months of operation, without loss of refinery production.

Mississippi Chemical officials called on Westinghouse to help them get a complete "packaged installation" with the best electrical equipment at no extra cost. One feature was that Westinghouse control centers were installed in nonhazardous locations throughout the plant. This gave Mississippi Chemical the advantages of centralized control without paying for more expensive explosion-proof equipment.

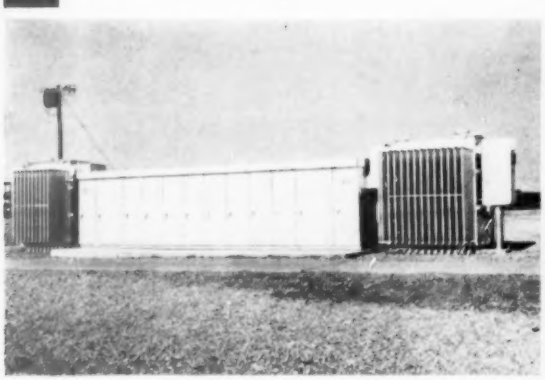
Texaco's Eagle Point Refinery got top-system dependability, efficiency and flexibility for future expansion. Westinghouse turbine-generators supply all the power, but there's also a tie-in with the local utility for emergency purposes. Dual-feeder cables carry power to all Westinghouse outdoor load centers. If one faults, the other can handle the full load. All Eagle Point has to do for any plant expansion is add substation capacity.

American Cyanamid and Westinghouse engineers worked out a power distribution system that prevents outages. If there's trouble on any feeder, power is switched to another. If a substation faults, other substations carry the load through cross connections. This system can be easily and inexpensively expanded as the plant grows.

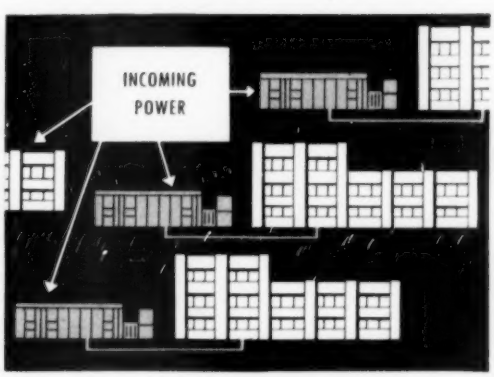
These solutions are only four examples of how Westinghouse equipment and services can meet your power distribution problems. If you'd like more information on the above, or other installations, call your Westinghouse representative. Or write to: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-94992

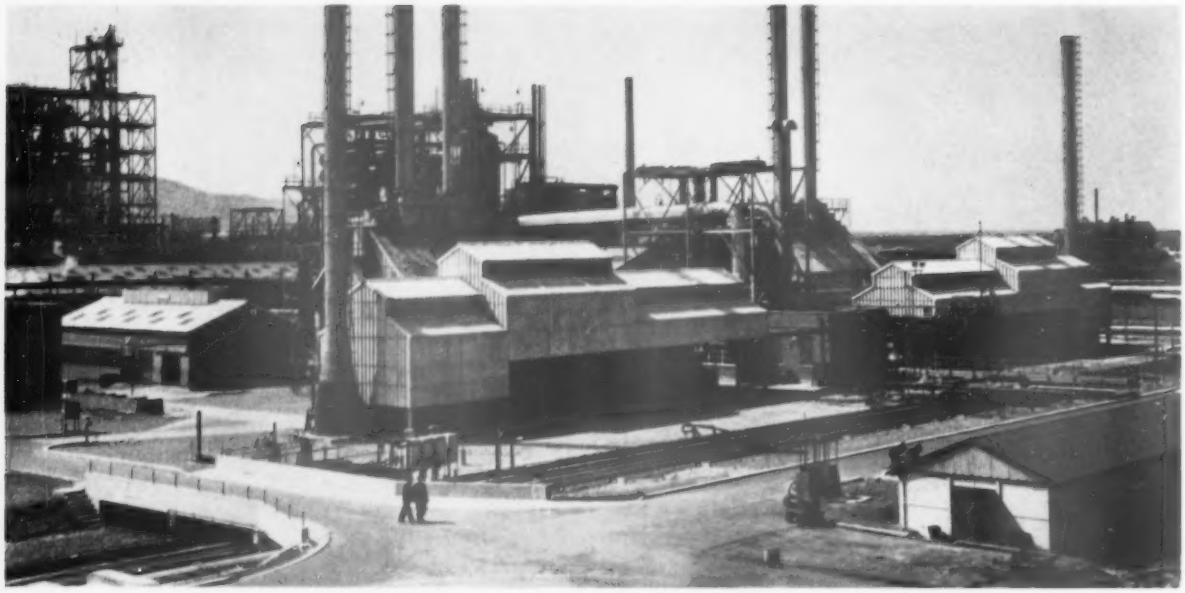
YOU CAN BE SURE...IF IT'S Westinghouse



Eagle Point Refinery's Westinghouse substations are complete with switchgear, transformers and circuit breakers in one, compact arrangement. The system is highly flexible and dependable.



American Cyanamid spotted 10 substations throughout the processing area. When new buildings are added, additional substations will be installed without interfering with production.



OIL AND STEAM HEATERS at No. 1 olefin plant at Wilton works of Imperial Chemical Industries, Ltd.

PETROCHEM REPORT

Britain Embarks on Big Chemical Program

In 1952 direct exports of British petrochemical products were valued at over 12½ million dollars, or nearly 5 per cent of all shipments from chemical industries

by V. S. Swaminathan

RECENT progress in refining techniques, particularly in catalytic processes, with the primary object of obtaining increased yields of gasoline of improved quality, has resulted in much greater availability of reactive gases, which constitute prime feed stocks for manufacture of synthetic organic chemicals. This, together with removal by the British Government, at the end of the war, of the hydrocarbon oils duty from oils needed for chemical syntheses has enabled Britain to embark on large-scale petrochemical operations.

Before long Britain should have an oil-refining capacity of approximately 29 million long tons of crude petroleum a year (approximately 580,000 bbl. per day) which should give a total hydrocarbon-gas availability of the order of 1,500,000 tons per annum (quite roughly some 11,000,000 cu. ft. per day). Some of this gas would be utilized in the refinery operations, and a portion of the unsaturated gases could be converted back into gasoline again. There still remains approximately 800,000 tons a year (roughly between 5,000,000 and 6,000,000 cu. ft. per day) of hydrocarbon gas available from refineries, which is, however, rather scattered about the country.

Petrochemical Industry

The United Kingdom petroleum chemicals industry consists mainly of five cracking plants with their ancillary chemical processing units. There are, in addition, several subsidiary processes, such as detergents from wax cracking or shale distillation, chlorinated waxes and sulfur from refinery gases, as well as carbon black.

Petrochem growth . . . Apart from British Celanese, Ltd., which built and operated the pioneer petrochemical plant to produce ethylene and propylene for the company's internal needs in 1942, the first major development in the U. K. followed the erection of large refineries for the production of a wide range of chemicals based on propylene and butylenes.

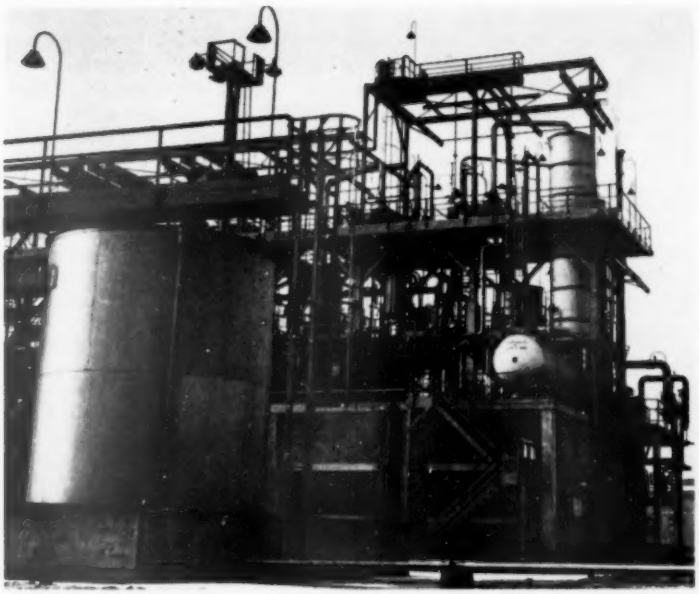
The second major phase pertained to the provision of ethylene to meet the rapidly mounting demand for polythene, styrene, ethylene glycol, and a substantial range of products based on ethylene oxide and glycol.

The extraction of butadiene is planned at Wilton Works (Imperial Chemical Industries, Ltd.), and a similar scheme is being looked into at Grangemouth (British Petroleum Chemicals, Ltd.). Shell at Stanlow should be producing xylene and toluene in commercial quantities before the end of this year.

Petrochem contribution . . . The petroleum chemicals industry is making a threefold contribution to Britain's economy: (1) supplying chemicals previously imported (glycol ethers, ethanolamines, and monostyrene); (2) displacing older and less economic raw materials (synthetic ethyl alcohol instead of that from molasses), and (3) making available new raw materials (synthetic detergents, p-xylene and butadiene).

British Celanese

British Celanese, Ltd., built and operated the pioneer "chemicals from petroleum" plants in the U. K. as a log-



ISOPROPANOL PLANT of British Petroleum Chemicals, Ltd., installation at Grangemouth.

ACETONE UNIT at International Chemical Industries plant at Billingham.

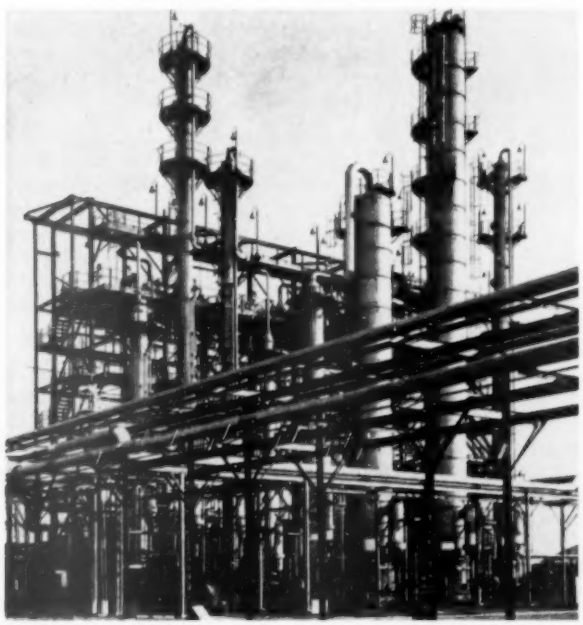
ical development of the search for cheap acetic acid and acetone. These installations, which are integrated with other important units in Spondon, Derbyshire, first went on stream in 1942. They produced, by vapor-phase cracking of gas oil, a mixture of olefins and aromatic liquids — ethylene and propylene in particular being obtainable in quite high yields.

Alcohols . . . The ethylene and propylene, after separation in a system relying on the techniques of absorption, compression, refrigeration, and distillation, are converted to ethanol and isopropanol respectively. The latter is readily transformed to acetone, and the ethanol to acetic acid, this last synthesis from ethanol being effected in a plant erected several years previously and initially operated entirely on ethanol produced by fermentation.

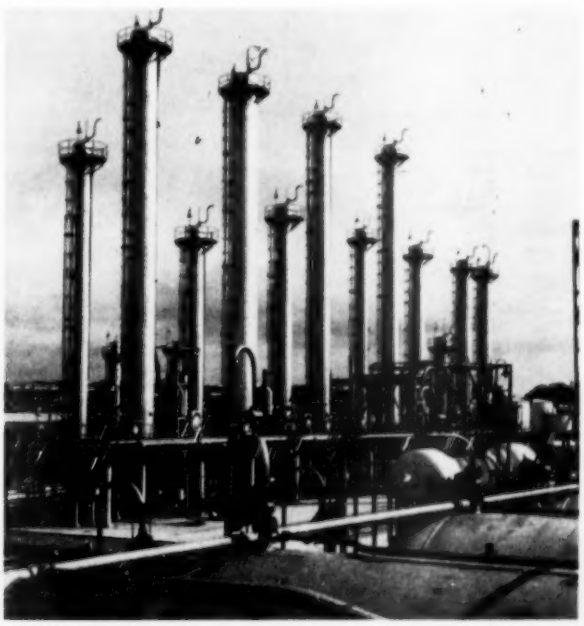
Shell Petrochemical

The production of a wide range of chemicals based on propylene and butylenes was the logical basis for Shell's petrochemical project at Thornton, Cheshire, which started operating in 1949, entailing an outlay of 4 million pounds (currently about $10,000,000).

Synthetic detergents . . . As early as 1942 Shell's Teepol plant began producing synthetic detergents on a commercial scale. Teepol is a sulfated secondary alcohol prepared by the sulfonation of olefins obtained by the cracking of byproduct wax stemming from lube-oil manufacture. This unit's capacity for producing Teepol current-



DISTILLATION UNIT for recovery of styrene monomer at Grangemouth plant of Forth Chemicals, Ltd.



DISTILLATION UNIT for separation of petrochemical fractions at Shell Chemical's Stanlow works.

ly exceeds 60,000 long tons or about 136,000,000 lb. a year.

Gas-oil cracking . . . The feed stock of Shell's solvents plant at Stanlow is gas oil, fed to the thermal cracking unit where it is cracked at high temperature and low pressure. This process yields a mixture of light gases, volatile liquids, and heavy liquids. These are roughly separated in a fractionation tower into a heavy oil used for fuel, and a mixture of light components.

The latter are fed to a gas-separation unit, and split up into five fractions: a light gas, used for fuel; three other fractions containing hydrocarbons, three other fractions with 3, 4, and 5 carbon atom chains respectively; and a volatile liquid, which, following suitable treatment, is blended with motor spirit.

Solvents . . . It is the C_3 and C_4 fractions which form the feed stocks for the manufacture of solvents like ketones, alcohols, and ethers. This installation has capacity to produce over 50,000,000 lb. of solvents a year. Products of the Stanlow cracker with their principal uses are given in Table 1.

TABLE 1—WEIGHT—PER CENT, BASED ON CHARGE

C_2s and lighter	28
Use	
Fuel, dichloroethane, ethylene chloride.	
C_3s	17
Propylene: for isopropanol; thence to acetone (5,000-6,000 tons a year) and hydrogen; thence to diacetone alcohol, mesityl oxide, and methyl isobutyl ketone. **Propane** to fuel.	
C_4s	11
Butylene: for secondary butyl alcohol and thence to methyl ethyl ketone and hydrogen.	
C_5s (recycled)	19
Part used as absorber oil in gas-separation plant and part after hydrogenation as motor fuel.	
Heavy fuel oil	25
Fuel.	
Total	100

Ethylene Manufacture

Dr. M. A. Matthews (Shell Petroleum Co., Ltd.) stated recently that his company would be producing ethylene some time this year (1953) as a by-product from oil-refinery operations for use in chemical synthesis in an adjoining plant. Also, when the Stanlow Platformer unit comes on stream, Shell in Britain will be producing xylenes in commercial quantities.

Three plants have been built so far primarily for the production of ethylene: one by Petrochemicals, Ltd., at Partington near Manchester to manufacture ethylene for glycol and other oxide derivatives; the second by British Petroleum Chemicals, Ltd., at Grangemouth, Scotland, where ethylene is converted to ethyl alcohol and styrene, and the third by Imperial Chemical Industries, Ltd., at Wilton, to produce ethylene for polythene, and to a lesser extent for ethylene oxide products. Though aimed essentially at the production of ethylene and its derivatives, these installations also engage in other activities.

Catarole Process

Petroleum Chemicals, Ltd., employs the Catarole process for the simultaneous production of olefins and aromatics by the deep cracking of petroleum distillates. Here, the naphtha at 150°-250° C. (300°-480° F.) is preheated and cracked at around 700° C. (1,300° F.) and pressures of 20-50 psig. Products of cracking are rapidly quenched at 120° C (250° F.).

Typical yields are given below:

Input: Middle East naphtha (150°-230° C. or 300°-450° F.).

	Weight (%)
Gases:	
Hydrogen and methane	15.6
Ethane	9.3
Ethylene	11.1
Propane	1.3
Propylene	10.1
C_4's	2.7
Gas losses	2.0
Total gases	52.1
Liquids:	
Nitration benzene	4.7
Nitration toluene	5.2
Refined xylenes	4.0
Styrene	0.5
Solvent (150°-190° C. or 300°-375° F.)	3.9
Indene and methyl styrene resins	2.0
Naphthalene	1.0
Higher-boiling solvents (230°-300° C. or 450°-575° F.)	5.1
Light solvents and polymers not included above	3.5
Heavy oil and pitch	11.4
Cracking and refining losses	6.6
Total liquids	47.9
Total	100.0

Liquid yield . . . This (expressed as per cent by weight on charge stock) from Catarole cracking is virtually independent of the boiling point of the charge stock over the range 100°-300° C. (212°-575° F.) but for any selected narrow range it is appreciably affected by the density of the charge.

Thus, with a highly paraffinic charge stock the liquid yield (about 50 per cent) is lower than with a naphthenic feed (around 60 per cent), and this, in turn, is somewhat below the yield from a more aromatic feed.

The liquid product is highly aromatic (over 90 per cent). The distillation curve of the highly aromatic product changes with the boiling range of the feed stock; if a naphtha feed—say, 150°-250° C. (300°-480° F.) boiling range—is cracked, then some 60-70 per cent of the liquid produced boils below 180° C. (355° F.) whereas if a gas-oil feed is used, the percentage of aromatics boiling below 180° C. (355° F.) falls to nearly 40 per cent.

The very high content of aromatics in the liquid product from Catarole cracking and the absence of sulfur, nitrogen, and oxygen simplifies recovery and purification of the products.

Separating products . . . The gas-separation plant of Petrochemicals, Ltd., produces ethylene, a propane-propylene stream, and a mixed C_4 stream. Ethylene is converted into ethylene chlorohydrin and glycol; propylene into isopropyl alcohol, while the butane-butylene stream is used as bottled gas.

The unique feature of this plant is the working up of the liquid fraction. This material is wholly aromatic in nature, and by simple distillation procedures the usual aromatic coal-tar products (benzene, toluene, xylene, alkyl benzene, naphthalene, and alkyl naphthalene) are separated.

This installation also produces resins obtained from styrene, alkylated styrenes, and indene contained in the cracking products. Another noteworthy feature is disposal of the residual gases (methane and ethane), which are piped to adjoining gas works supplying Manchester City.

Catarole capacity . . . Entailing an outlay in round figures of 10 million pounds (currently about $25,000,000), capacity of the Petrochemicals plant is 75,000 long tons of naphtha a year (about 1,700 bbl. per day) of which approximately 25,000 tons (nearly 600 bbl. daily) are made into ethylene, propylene, and the butylenes.

Ethylene oxide . . . In collaboration with Scientific Design Co., New York, Petrocarbon, Ltd., (research, design, development and construction company of the M.O.R. Group) has developed a process for the production of ethylene oxide by direct oxidation of ethylene.

British Petroleum Chemicals, Ltd.

Financial outlay on the first stage of development of the Grangemouth plant of British Petroleum Chemicals, Ltd., exceeds £5,000,000. Plant construction was organized and managed by Anglo-Iranian Oil Co. with Stone & Webster Engineering Corp., U.S.A., and its associates, E. B. Badger & Son, Ltd., (Great Britain) as principal contractors. This installation has an annual throughput of about 660,000,000 bbl. of ethyl alcohol and isopropyl alcohol.

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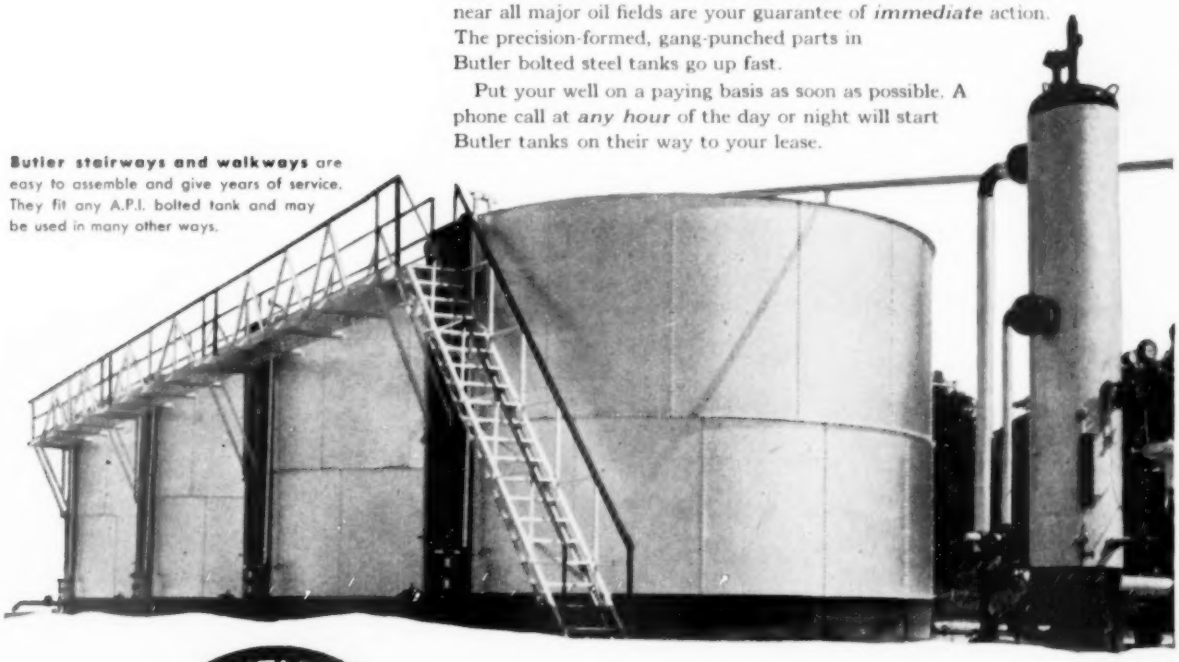

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Naphtha cracking . . . These alcohols are derived from ethylene and propylene respectively. Gases are obtained from the gas-fractionation system of the basic cracking plant. Feed stock is naphtha derived from Middle East crude, and is obtained from the adjacent Grangemouth refinery. This is vaporized, mixed with steam, and subjected to thermal cracking in a series of tubular furnaces. Ethylene and propylene production depends on a careful maintenance of operating temperature, pressure, and contact time at any one time. By varying some of these factors a considerable measure of flexibility is achieved.

Making alcohol . . . The two units for converting ethylene and propylene into the corresponding alcohols are typical of the two main techniques employed in the industry, namely, direct catalytic hydration for ethyl alcohol manufacture, and the sulfation route for isopropyl alcohol.

The ethyl alcohol process is that developed by Shell Development Co. in the United States. The isopropanol process is that evolved by the Distillers Co., Ltd., employing the absorption of propylene in sulfuric acid of requisite strength under carefully selected conditions. The rich acid liquid is then hydrolyzed by dilution with water, the crude alcohol is stripped from the acid and finally purified by distillation. It was stated late in August that current output of both ethyl and isopropyl alcohols is in excess of designed capacity, and the company intends extending the range of products manufactured at Grangemouth.

Forth Chemicals, Ltd.

The plant of Forth Chemicals, Ltd., formed in 1949, in which British Petroleum Chemicals holds a two-thirds share of capital and the English Monsanto concern one-third, came on stream in early 1953, and reached full production (8,000 long tons of monomeric styrene) last May. Basic process designs for this unit came from Monsanto Chemical Co. of the United States, while the ethylene feed stock for the plant stems from the B.P.C. cracking plant. The main goal of this plant is to provide an indigenous source of raw material for the manufacture of polystyrene molding crystals.

Monsanto Chemicals, Ltd.

The £3,000,000 ($7,500,000) Newport factory of Monsanto Chemicals, Ltd., is manufacturing products which Britain had previously been importing and which are in increasing demand by the domestic industry as well as for export. The present layout, Phase 1 of the over-all plan, is designed for the production of styrene plastic, detergents, oil additives, preservatives, fungicides, and "Aroclors." At the Newport factory the extensive construction program launched in 1947 was completed in 1952.

International Chemical Industries

The I.C.I. petrochemicals project has so far entailed an outlay of £17,000,000 ($42,500,000). Major divisions of the company operating plants at Wilton are Alkali, Billingham, Dyestuffs, and Plastics. Among units operated by Billingham division are the olefin unit comprising pyrolysis, gas-separation, and gasoline-treatment sections; ethylene oxide unit, and ethylene glycol unit. These link together to form part of its plants making chemicals from petroleum distillate oil, which, in addition, comprise the polythene units operated by Alkali division at Wilton and at Winnington, Cheshire; the Lissapol "N" synthetic detergent plant operated by Dyestuffs division at Wilton and the propylene hydration, pure isopropanol, acetone, and butanol plants operated by Billingham division at its main works at Billingham-on-Tees.

Wilton divisions . . . This company's experiment at Wilton is of singular interest on the development side. Instead of building several small plants for many divisions it is putting together a group to make up an economical setup. The Wilton Works has an administrative body to deal with all the general functions—power, roads, sewers, water supply, and so on. The company's different divisions build their various installations at Wilton and operate them themselves, being charged in return a fair proportion of the general overhead.

Ten plants at Wilton . . . So far, 10 manufacturing plants have been built at Wilton belonging to 5 different sections of the company. The first ones, Perspex (methyl methacrylate) and phenol formaldehyde molding powders were installed in 1949. Two years later followed formaldehyde, olefins, ethylene oxide, glycol and Lissapol detergent. Alpha-naphthylamine, polyethylene, and urea formaldehyde were just starting then and continued through 1952. Phthalic anhydride and Terylene synthetic fiber plants are now under construction. Another novel development at Wilton is the trucking of liquid ethylene 150 miles to Winnington, the original polyethylene plant, prior to the startup of the Wilton polythene plant.

Erection of all units was carried out by, or under the control of, the Wilton Works construction organization. The olefin plant was designed and engineered by M. W. Kellogg Co., of New York. Low Temperature Develop-

(Continued on page 144)

Table 2—Wilton Petrochemicals Plant—Raw Materials Used and Main and Subsidiary Products

Raw materials—	Plant	Main products	Subsidiary products	Destination of main or subsidiary product
Light distillate oil*	A. No. 1 olefin plant	Ethylene		To plants B and E
		Propylene		To plant G
			Tail gas (hydrogen, methane)	To Ammonia Works and Oil Works, Billingham
			Naphtha	Disposal as motor fuel
			Butylenes	From Billingham**
Ethylene, chlorine†, lime‡	B. Ethylene oxide plant	Ethylene oxide		To plants C and F
			Ethylene dichloride	For sale
Ethylene oxide	C. Ethylene glycol plant	Ethylene glycol		For Terylene pilot plants and for sale
			Diglycol	For sale
Ethylene	E. Polythene plants	Polythene		For sale
Ethylene oxide, alkyl phenols§	F. Lissapol "N" plant	Lissapol "N"		For sale as detergent
Propylene, compressed CO and hydrogen¶	G. Isopropanol, acetone and butanol plants			
		Isopropanol		Raw material for acetone and sale
		Butanols		For use in I.C.I. and sale
		Acetone		Raw material for Perspex, transparent plastic and solvent uses

*Received from tanker at Teesport and pumped to Wilton site. †From the General Chemicals Division of I.C.I. ‡From the Lime Division of I.C.I. §From the Billingham Division of I.C.I. ¶For butanol. Via "link" pipe lines to Billingham passing under the River Tees. **By cooperation with oil companies.

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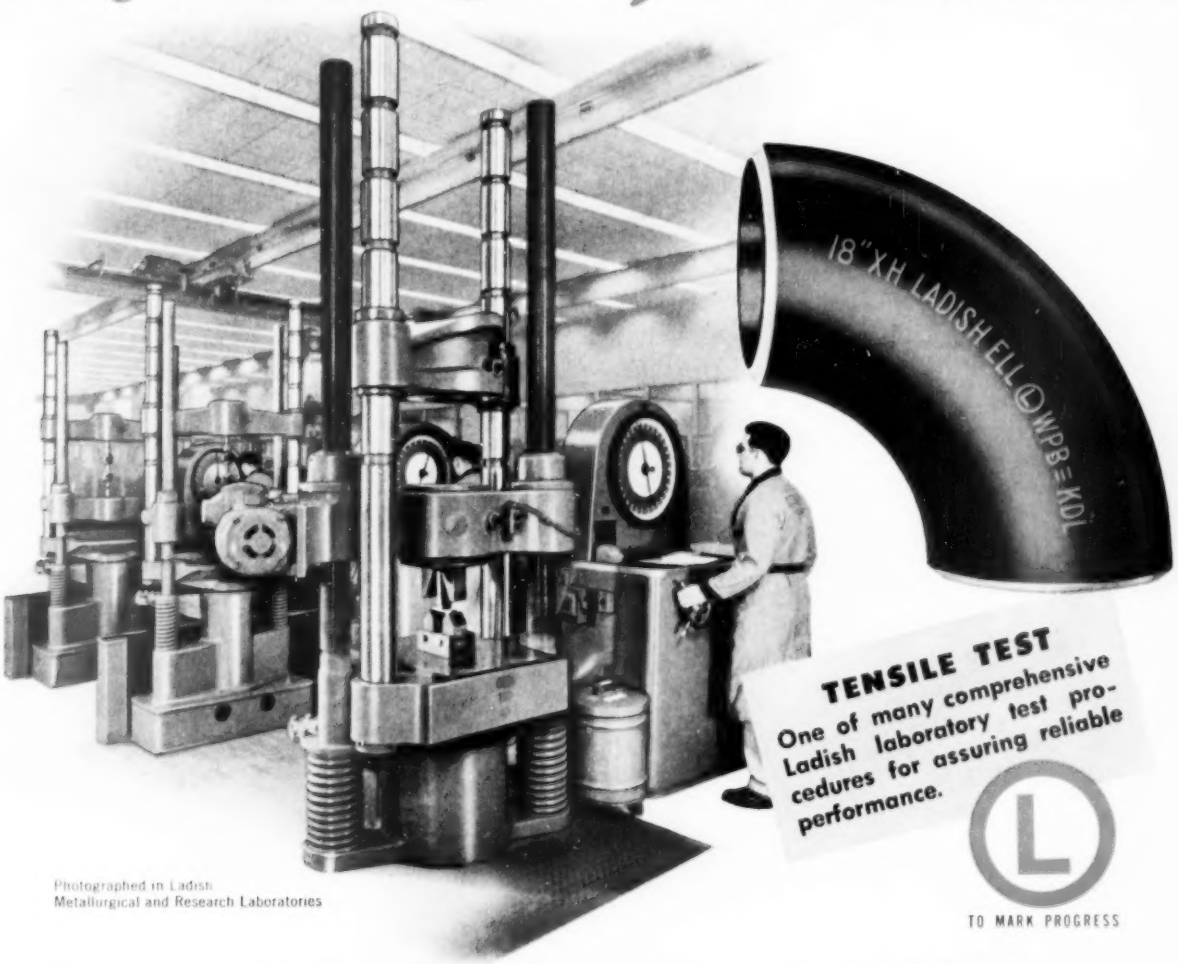

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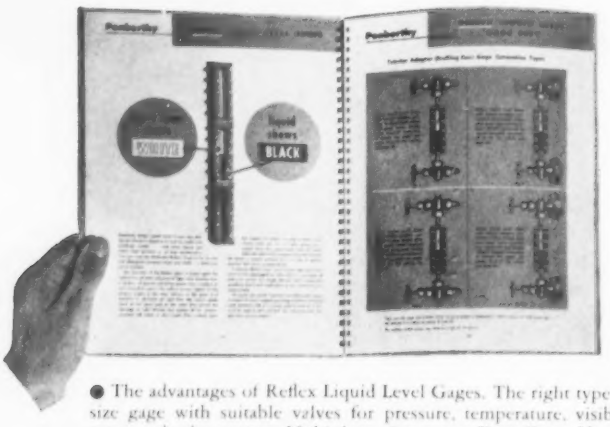

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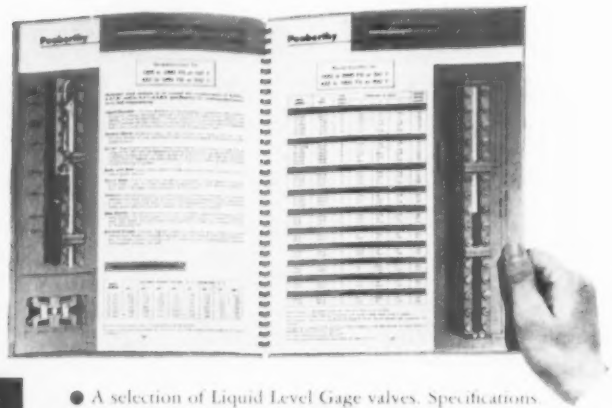

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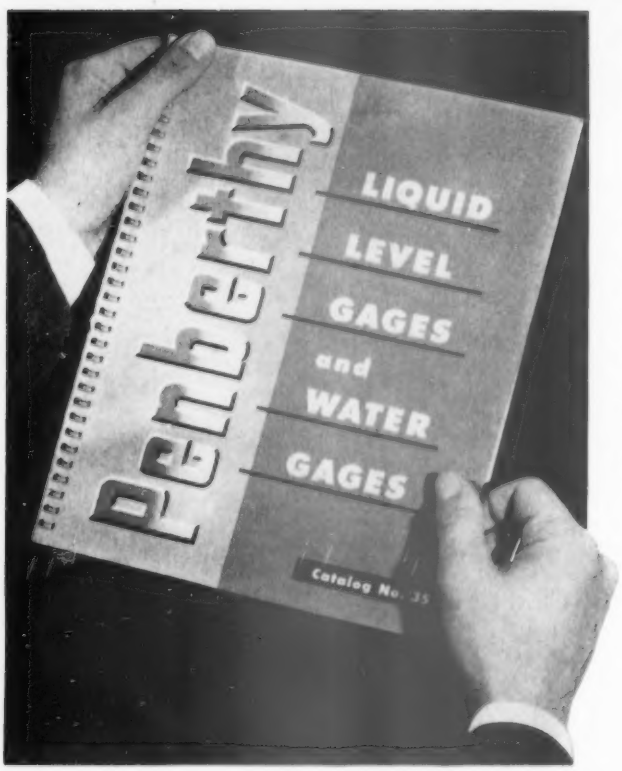

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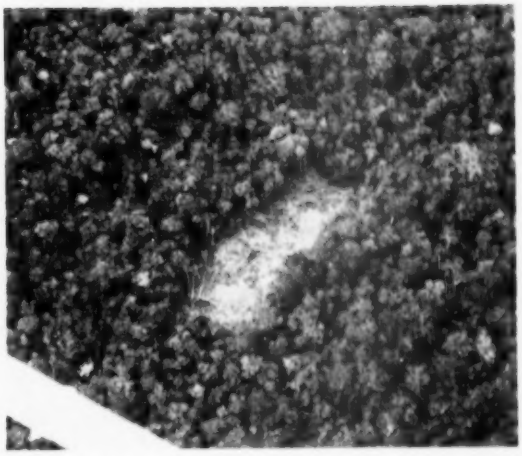

Landing strips in the heart of the jungle are quickly cleared by power chain saws and double-edged axes.

Helicopters Proved Practical in

Contractor's crew operates from the seismic party base at nearest water transportation.

Jungle Seismic Operations

Clearings are relatively easy to make and contractor is willing to base entire crew out on the job, where short range of helicopters is not a limiting factor

PROBABLY every operator engaged in portable seismographing in tropical jungle has sought at one time or another to find a practical means of using helicopters, particularly after they were used successfully in the swamps of the Gulf Coast.

In the Far East, where slow and tedious man-packing of instruments, drills, and supplies through cut trails in the jungle is the rule, serious consideration was given to helicopters as a means of speeding up operations as early as 1946.

Added impetus to finding means of economy and speed resulted in the postwar period from the ever-increasing cost of labor in the Far East. However, although a number of the helicopter operators and contractors were contacted, none could come up with a practical plan for operating in the jungle.

Method developed . . . In mid-1952, a representative of Bahamas Helicopters, Ltd., made a trip to Sorong in the Vogelkop in Netherlands New Guinea to ascertain whether or not it would be feasible to use helicopters with seismic parties operating in that area. He remained in New Guinea observing operations for several weeks and then returned to The Hague and New York with the idea of clearing helicopter landing strips in the jungle at each shot point—the shot points being spaced at approximately 1,500 m. or about 5,000 ft.

At first blush, the clearing of an area 100 by 50 m. (about the size of a football field) at each shot point in the jungle seemed an extremely costly undertaking, if not a completely unfeasible project. However, the operating company, Netherlands New Guinea Petroleum Maatschappij*, agreed to undertake an experiment in the use of the helicopters with one of its seismic parties on a 6-month basis.

Three helicopters were shipped to New Guinea and the crew, consisting of a chief pilot, two pilots, a chief mechanic, three mechanics, and a lumberjack, arrived in August and began assembling the helicopters. One helicopter was assembled and flown out some 125 miles to the job, the lumberjack was given twenty Papuas and operations were begun late in August. About two weeks later another helicopter had been assembled and it too was flown out to the job. The third helicopter was assembled and retained as stand-by at Jefman airfield near Sorong.

The helicopters used, Bell 47-D's, are capable of lifting a payload of about 400 pounds. Of course, the range is limited, but one of the factors which made operation in the jungle feasible is that the contractor was will-

*Joint company owned 40 per cent by N. V. De Bataafsche Petroleum Mij (Royal Dutch-Shell), 40 per cent by Standard-Vacuum Oil Co., and 20 per cent by Far Pacific Investments, Inc. (Caltex).

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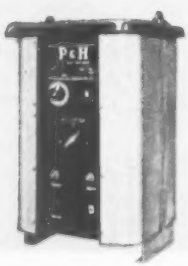

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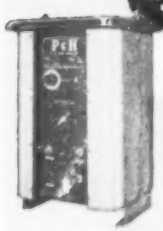

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ing to have his crew operate from the seismic party base at nearest water transportation—and in the jungle there is usually water within reasonable distances of the seismic operations.

Landing strips . . . The lumberjack, a professional from the Northwest, lost no time in instructing the Papuas in the use of power chain saws and double-edged axes, with which they promptly became very expert tree fellers. One tree 3 ft. in diameter was seen felled by a power saw in a matter of 2 minutes. A horizontal cut was first made partly through the trunk and then a diagonal cut downward above that, the resulting wedge then being knocked out. The saw was then placed on the other side of the tree and the horizontal cut started. By the time that cut was one-third of the way through, the tree had begun to fall. Another tree (about 1½ ft. in diameter) was seen felled by one Papua using a double-edged ax in 5 minutes.

Part of the trick of making the clearings, of course, is that the falling trees fell other trees. If the trees are felled properly, a reasonable clearing is made without any great effort. However, if the trees pile up as some times is unavoidable, a small platform (6½ by 10 ft.) is built on the resulting mass and thereon the helicopter lands. At the time the clearing operations were observed, the cutting crew was managing one clearing per day and hoped to do better.

In operating the helicopters, the pilots take off and circle above the clearing until they have attained an altitude of 2,000 ft., then they proceed along the trail from clearing to clearing, so that if the engine should fail the resulting drop will enable autogyration to become effective and a controlled landing at the nearest clearing to be made. No corners are cut at the expense of safety. When the trail intersects another at right angles, that is the route the helicopters are flown.

How they work . . . The normal and routine function of the helicopters in New Guinea is to carry dynamite to the shot points. That is a continuing process because very large charges are used. However, the instrument setup and shot points are connected with the helicopter base by voice-power telephone and at any time either the drills or instruments require moving, the helicopters are called and the dynamite supplying is interrupted for a short time. The instruments or drills are moved ahead by the helicopter, while the instrument crew moves the geophones or the drill crew stroll to the next shot-point.

As an example of the flexibility provided by the use of helicopters, the seismograph operator one day had an amplifier go bad. He immediately called the helicopter which arrived in about 10 minutes, some 15 km. from the base. The operator with his amplifier climbed in and 10 minutes later he was repairing his instrument on the houseboat where test equipment was available. A short time later, the operator flew back to the setup with his repaired instrument and shooting was resumed. The same trip, walking, would have taken him 2 days.

Results . . . Whether or not the use of the helicopters in these jungle seismic operations will prove economically sound is yet to be determined. However, the results were sufficiently encouraging that the contract was extended. One hundred Papuas were taken off the party payroll immediately after the helicopters were placed in operation and it was hoped that a few more could be released as experience was gained. As an example of what made the release of the Papuas possible, one helicopter flew 99 cases of dynamite to the shot point in one day. The shot point was at such a distance from the magazine that at least 100 Papuas each carrying a case of dynamite would have spent about 3 days in accomplishing the round trip.

Even though 100 Papuas were released, the payroll reduction will not result in a saving equal to the contract price of the helicopters, but it is hoped and believed that the use of the helicopters will enable at least doubling the production of the seismic party—and this will result in real economy of operation by virtue of reduced unit cost. In this connection the above example regarding the repairing of the amplifier is in point.

The two techniques which make helicopter operations with the seismic party in jungle feasible are (1) the relative ease with which clearings can be made, and (2) the willingness of the contractor to base his whole crew, pilots and mechanics, out on the job, where the short range of the helicopters is not a limiting factor.

BOOK

THE OIL AND GAS FIELDS OF WEST TEXAS, PART 1 (Railroad Commission District 7-C). Published by Five Star Oil Report, Inc., Houston. 304 pp. $25 to Five Star subscribers; $35 to nonsubscribers.

This book is a complete study of the oil and gas fields in the district it covers. A partial list of contents includes survey maps of each county, review of West Texas geology, structure and area maps, cross-sections, production statistics, and field histories. A bibliography of articles and books pertaining to fields and producing formations is also included.

A.I.M.E. DIGESTS...

Here are abstracts of some of the papers presented at the annual fall meeting of the Pacific Petroleum Chapter of the American Institute of Mining and Metallurgical Engineers, Los Angeles, October 1-2, 1953.

Oil Base Emulsion Drilling Fluids, Their History, and a Laboratory Evaluation of Their Characteristics

CHARLES WRIGHT, Oilwell Research, Inc.

OIL-BASE-EMULSION drilling and completion fluids have been used in over 400 wells in the past 3 years. Besides yielding high completion and long time productivities, the oil-base emulsion fluids are inert to the usual contaminants and can be compounded to low mud weights when desired. Improved oil-base-emulsion muds are now available which suspend cuttings, can be weighted, and which do not cause hydratable material to swell. Shale hydration tests in oil-base-emulsion muds are described.

Performance of Upper Terminal Zone, Fault Block III, Wilmington Field

GEORGE AUGUST and STUART N. DAVIDSON, Long Beach Harbor Department.

A SUMMARY of a study of the Upper Terminal zone, Fault Block III reservoir of Wilmington oil field, Los Angeles County, California, is presented with emphasis on reservoir conditions.

First production was obtained in January 1938 with development being essentially completed by April 1942. On November 17, 1949, an earthquake movement at about the 1,600-ft. level resulted in casing offsets so severe as to cause abandonment of many wells. Certain areas of the pool were completely redeveloped. The production performance of these recompletions was so markedly superior even to that of the original performance of wells drilled 7 to 8 years earlier in the life of the pool that five-spotting and replacement drilling were undertaken over the entire reservoir.

A Description and Analysis of an Efficient Continuous Flow Gas-Lift Installation

A. F. BERTUZZI, J. K. WELCHON, and F. H. POETTMANN, Phillips Petroleum Co.

A SERIES of gas-lift tests were made which showed that gas-lift performance could be calculated if reasonably accurate data on the producing characteristics of the well are available. The test installation is described. Essential features of test installation were a rate-of-flow controller to regulate the input gas and an auxiliary string of small-diameter tubing to conduct the input gas to the point of injection in the eductor tubing. In general, for continuous gas-lift operation, injection should be as deep as possible consistent with available gas pressure and rate of production desired. Calculated curves are presented which completely characterize the gas-lift performance of the well tested.

A Contribution to Electric-Log Interpretation in Shaly Sands

A. POUPON, M. E. LOY, and M. P. TIXIER, Schlumberger Well Surveying Corp.

A SIMPLE tentative method of qualitative interpretation of electric logs is described, which should apply to sands containing either laminated shales (shaly sands of the sandwich type) or dispersed shale (dirty sands), or both. The application of this method only requires information provided by the electric logs.

An extension of the method to quantitative analysis is suggested, which makes use of reasonable assumptions on some of the factors involved. Nomographic charts are provided to facilitate the necessary computations. Conditions necessary for a reliable application of the method are discussed. Field examples illustrate the paper.

Improved Hydraulic Rodless Pump Performance Through Use of Electrical Sediment Separator

R. E. PHELAN, Shell Oil Co.

ONE of the difficulties encountered in Kobe pumping operations is the problem of providing clean power oil. On April 8, 1952, an electrical sediment separator was procured from Petrolite Corp. and installed at Ten Section field. The unit operated at a rate of 1,000 bbl. per day until December 31, 1952. Results from this test have shown the engine-end efficiency decline of the five pumps was reduced from 12 per cent per month to 1 per cent per month. The well pulling and pump repair cost for the five wells would be reduced about $3,000 per year.

On February 15, 1953, the separator was installed at another location in Ten Section field where 4,000 bbl. of power oil was treated daily. A 3,000-bbl. settling tank was bypassed and the total amount of power oil treated in the separator. The resulting savings in well pulling and pump repair costs for the 13 wells amounts to about $7,500 yearly.

Study of Undersaturation During Repressuring and Supersaturation During Flow of Oil to Wells

R. V. HIGGINS, U. S. Bureau of Mines.

A QUANTITATIVE estimate of undersaturation and supersaturation was calculated from earlier laboratory findings and other investigations of diffusion of gas in oil as a function of the depth of oil. The results showed that the diffusion of the gas is rapid enough so that for all practical purposes no supersaturation exists during the flow of oil to wells and no undersaturation obtains during repressuring of reservoir sands having some effective permeability to gas.

The reason diffusion of the gas virtually keeps the oil saturated is the long time required in radial flow for oil to reach the well and the slow rate at which the pressure in reservoirs is increased during repressuring.

Method for Calculation Recovery Of Light Hydrocarbons by Gas Cycling Semidepleted Dark Oil Sands

C. N. SIMM, California Research Corp.

RESULTS are presented of an experimental and theoretical investigation of the recovery of light hydrocarbons from a semidepleted dark oil sand by their vaporization into an injected dry gas. A general method of circulating recovery is presented which relates effluent-gas composition to well spacing, time and rate of cycling, reservoir hydrocarbon content, pressure, and temperature. The proposed equations and method of application may be used to calculate cycling recovery in any reservoir for which customary material balance data are available.

In experiments with sand packs, recovery by dry-gas cycling was observed to be a direct function of temperature and an inverse function of pressure. Flow rate of cycling gas had no effect upon recovery at velocities encountered in the field.

New Catalytic Reforming Process

(Continued from page 121)

scribed above. The basic change involves provisions for regenerating a single reactor without interrupting the processing cycle on the remaining reactors. The choice of design is dependent upon an economic consideration of the balance between capital costs and increased earnings as affected by each design.

It may be desirable in the original design of the unit to provide facilities in addition to those mentioned above. A fractionation tower, integrated with the unit, for most economic feed-stock fractionation, is such an item. Existing facilities may in many cases be adequate. When processing high-sulfur naphthas, such as some West Texas or Middle East sources, it may prove economical to remove H_2S from the recycle gas with an absorbent system.

Economics

The question of the specific need of a refiner can be solved by an economic consideration of the factors involved. In general, catalyst cost per barrel of reformate will vary from $0.03 to $0.10 depending upon feed stocks and the octane requirement. A breakdown of total typical operating cost of 21 cents per barrel of reformate is shown in

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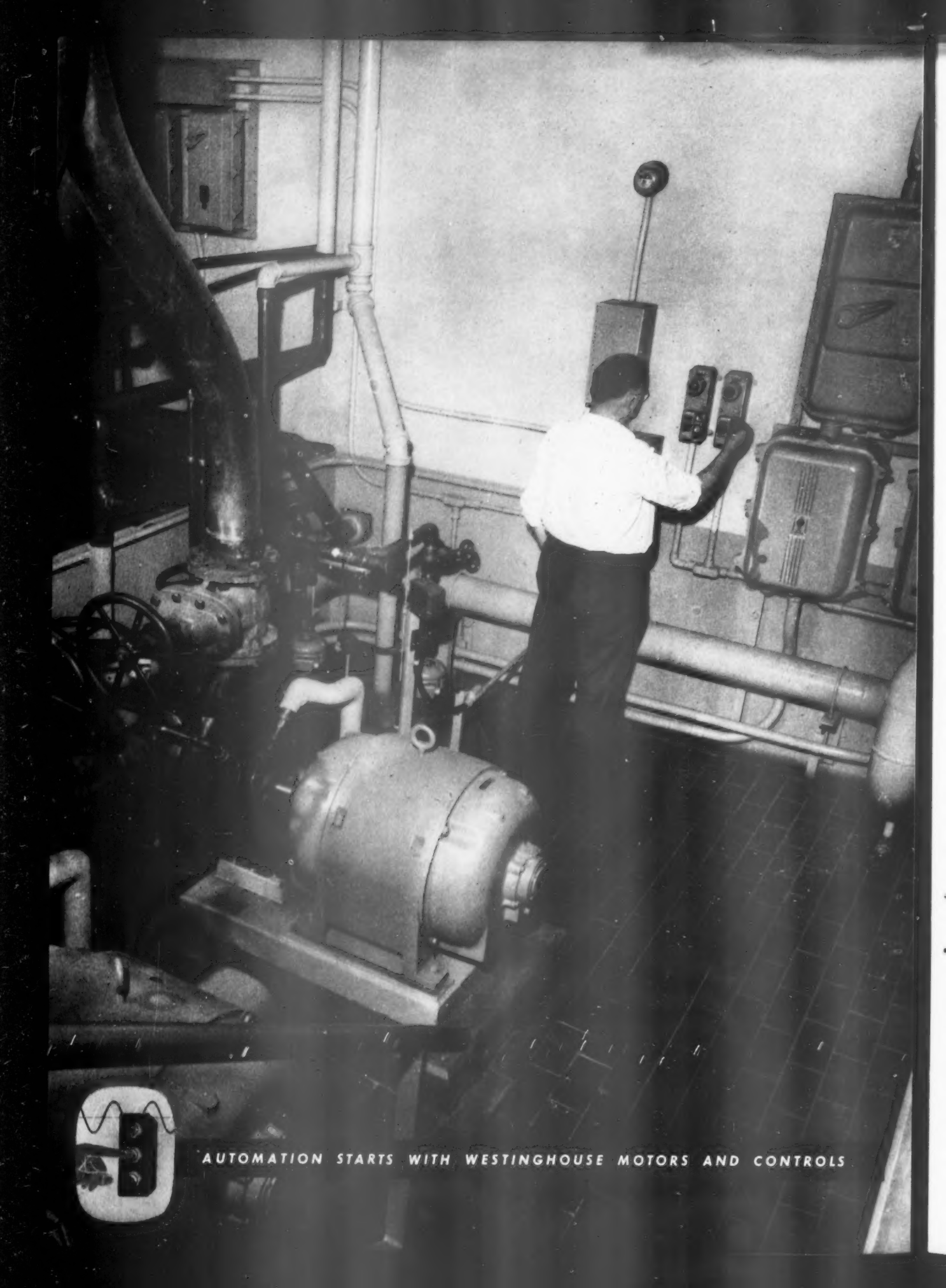

AUTOMATION STARTS WITH WESTINGHOUSE MOTORS AND CONTROLS

How to provide power for pumps and protection for motors

Handling fluids for chemical processing is a long, hard grind for motors and controls. Pump loads vary . . . liquid supply may fall off one minute and the next minute your pumps may have to tackle a full stream of heavy material. This condition emphasizes the need for the power and overload protection of Life-Line* Motors and Controls.

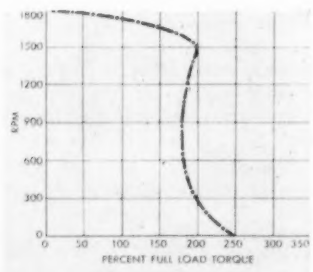
Westinghouse Life-Line Motors have the necessary electrical and mechanical stamina to master heavy and varying loads. They deliver power easily, surely, and continuously . . . take the many changes-of-pace in stride.

Full overload protection for your motors is assured with the use of Westinghouse Life-Line Starters. The bimetallic overload relay, standard on all Life-Line Starters, reacts to all conditions of load that slow down the motor armature causing damaging heat. With a snap action, these relays provide quick, precise current interruption thereby guarding against motor damage. Years of constant usage will not lessen the effectiveness of this Life-Line Starter protection.

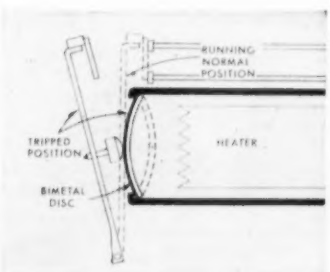
Special insulation and motor coatings give added protection to Life-Line Motors operating in moist, corrosive and other unfavorable conditions. Then, too, pre-lubricated bearings, advanced winding technique and dynamically balanced rotors cut maintenance on Life-Line Motors to the minimum.

Call your local Westinghouse representative for further information on motors and controls for the Chemical Industry. Ask him for descriptive booklets B-4792 and B-5444. If you prefer, write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21725

*Trade-Mark



Torque Curve Shows Efficiency... This torque curve of a Life-Line Motor shows the high starting torque, low starting current and low slip which make Life-Line especially suited for pumping operations.



Bimetallic Overload Relay . . . part of standard Life-Line Starters. It provides snap-action protection for motor windings and will not fail should the starter be reset while still "hot".

YOU CAN BE SURE...IF IT'S Westinghouse

Table 6. Proprietary charges are moderate.

The new Sinclair-Baker catalyst gives the refiner the advantage of a more flexible and economic catalytic reforming operation. Aromatic synthesis is maximized, more barrels of reformate are produced per pound of catalyst at all octane levels in continuous or regenerative operations, and feed-stocks pretreating is not required to combat metal or sulfur poisoning. As a result of these improvements, the refiner may select operating conditions to attain higher yields of high-octane reformate and of aromatics from a variety of naphthas with reasonable operating and fixed costs.

M. W. Kellogg Co. is offering the RD-150 catalyst for fixed-bed units with or without regeneration.

Baker & Co. will contract to manufacture RD-150 and recover the precious metal value. The catalyst is now produced in Baker's Newark plant and new facilities are being erected to meet increased requirements.

References

1. The Oil and Gas Journal, 51, No. 51, p. 131 (April 27, 1953).
2. Platt's Oilgram, 31, No. 78, p. 3 (April 22, 1953).

Acknowledgment

Presentation of this paper is made possible through the research efforts of a large group of individuals and makes adequate acknowledgment difficult. The authors wish to cite C. D. Keith, J. L. Gring, L. E. Olson, and W. E. Stewart, of Sinclair Research Laboratories, Inc., for their major contribution in this effort as well as the research staff of Baker & Co. under the direction of Dr. E. F. Rosenblatt. The permission of Sinclair Research Laboratories, Inc., for publication of this information is gratefully acknowledged.

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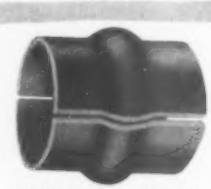

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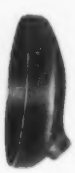
Pipe Line Half Soles

Concentric and Eccentric Welding Reducers



Flanged and Flued Heads to customer's specifications

Elliptical Manways

HACKNEY
IRON & STEEL COMPANY
ENID, OKLAHOMA

Britain Embarks on Big Chemical Program

(Continued from page 134)

ments, Ltd., London, designed and executed the refrigeration sets for the ethylene oxide plant, while the evaporators on the glycol plant were designed and completed by George Scott & Son (London), Ltd.

Pyrolysis plant . . . This has been purposely designed to run under a variety of operating conditions to make for maximum flexibility. Feed stock rate may vary from 50-75 million imperial gallons per year (4,000-6,000 bbl. per day) of light distillate oil, and naphtha or gasoline made from one-third to two-thirds of this amount. Designed output is upwards of 30,000 long tons per year (some 2,500,000 cu. ft. per day) of ethylene and some 1,700,000 cu. ft. daily of propylene.

Ethylene oxide plant . . . This operates the well-known chlorohydrin process. There are two chlorohydrin towers, two saponifiers, a refrigeration set, and a distillation train. Ethylene oxide is stored in horizontal tanks.

Ethylene glycol plant . . . Here ethylene oxide is reacted with water at 300 psig. pressure and about 200° C. (nearly 400° F.). Aqueous glycol is initially concentrated in triple-effect evaporators and thence purified by distillation.

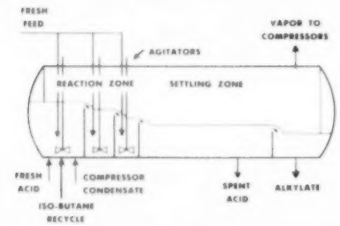
New facilities . . . Work is under way at Wilton on the erection of a para-xylene plant which, with the glycol unit, will provide the two essential organic raw materials for Terylene manufacture. As a further step toward the full use of all the materials which the Wilton olefin plant can provide, the carbonylation unit at Billingham has been extended to make butanols from propylene, and the plant for the production of isopropanol has, too, been brought into service. Schemes for the

REFINERY PROCESS NEWS

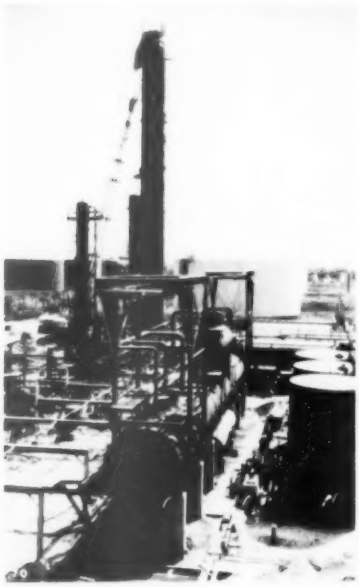
PUBLISHED BY REFINERY PROCESS DIVISION, THE M. W. KELLOGG COMPANY OCTOBER 1953

Another Alkylation Plant Well Underway

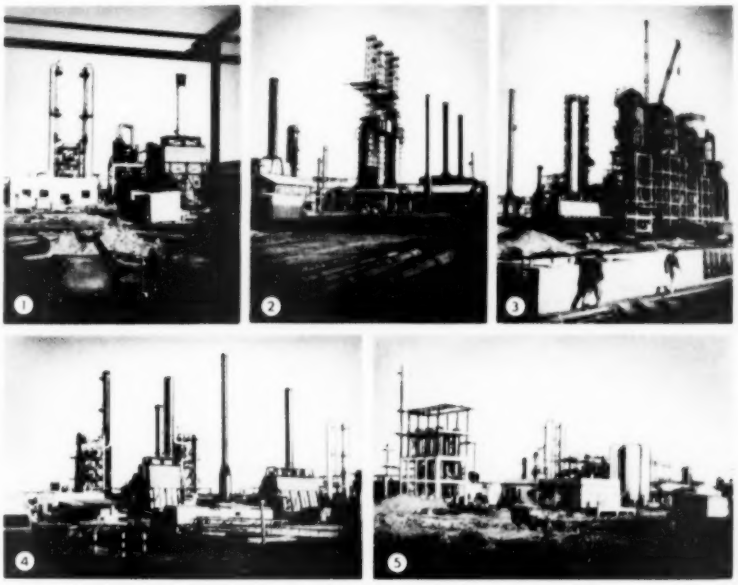
One of six Kellogg-designed alkylation units now in engineering or under construction, this one (see below) for a major East Coast refiner includes, as do the others, the unique Kellogg cascade reactor system, which has consistently produced the highest yield octane ratios at a minimum consumption of sulfuric acid.



Most important of the reasons for the improved efficiency of this new reactor is a design which provides for an unusually high isobutane-butylene ratio in the reaction phase. The reaction progresses most satisfactorily when the ratio is considerably in excess of the theoretical 4-1 ratio; Kellogg's design provides a 9-1 ratio without an increase in pumping or vessel costs.



Shown in the foreground is the Kellogg alkylation reactor. Large tower in the rear is the main isobutane-alkylate fractionator. The drums to the right are for sulfuric acid storage.



New Argentine Refinery Reflects Spread of U. S. Refining Techniques Abroad

One of six complete refineries now underway by Kellogg outside North America, this complete catalytic refinery for Yacimientos Petroliferos Fiscales in Argentina is indicative of the spread of modern U. S. refining techniques to countries which have been largely dependent upon imports to supply their needs for finished petroleum products. When on stream the new plant will have helped increase that country's domestic sources of refined oil by more than 30%.

It will be South America's most modern refinery in that it will contain most of the major catalytic processes currently employed to meet the high octane demands of the U. S. market.

Shown in the photographs are units for carrying out the eight principal processing steps to be included: (1) straight-run gasoline fractionation and vacuum distillation, (2) thermal cracking and delayed coking, (3) fluid catalytic cracking, (4) crude distillation, (5) catalytic polymerization and sulfuric acid alkylation. Not shown are product-treating units and the powerhouse.

Two indigenous crudes, Challaco and Comodoro Rivadaria, in a ratio of 25% to 75% respectively, will be charged to the refinery. Major final products will include nearly 2,500 BPD of aviation gasoline and more than 2,000 BPD each of diesel and fuel oil. The delayed coker, in preparing clean feed stock for the Fluid Catalytic Cracking Unit, will produce more than 600 tons of high quality coke daily.

One of Several Major Refinery Jobs in S. A.

This $70,000,000 Argentine refinery is only one of several major Kellogg projects currently underway in South America. These include two complete refineries of 5,000 BPD and 10,000 BPD capacities and nitrogen fertilizer facilities, at three different locations in Brazil, and a complete 20,000 BPD refinery in Chile.

In other parts of the world Kellogg projects include a complete 24,000 BPD thermal refinery in Iraq and a 70,000 BPD catalytic refinery for Australia, which will supply about 40% of that country's current product requirements.

(SEE REVERSE SIDE)

REFINERY PROCESS NEWS

CONTINUED FROM PRECEDING PAGE

Capacity of MWK Fluid Units Now Over Million BPD

The signing of several recent contracts for new Orthoflow Fluid catalytic crackers has brought the total fresh feed capacity of Kellogg-engineered FCCU's to well over 1,100,000 barrels per day. Included in this capacity are units ranging from 2,000 BPD to 63,000 BPD at locations all over the world.

When all these plants are operating, they will produce better than seven billion gallons of high quality motor gasoline annually or enough to provide every automobile in the world with an annual supply of about 100 gallons of gasoline.

One Out of Four Gallons From Kellogg Designed Units

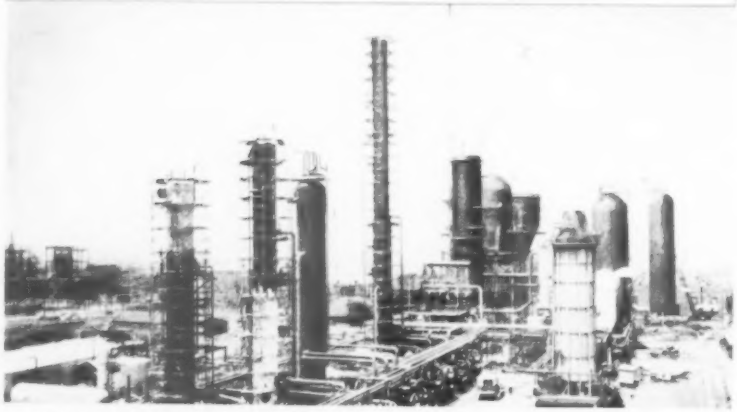
The figures above refer only to the production of Kellogg Fluid catalytic cracking units and do not include the billions of gallons of gasoline being produced by other types of Kellogg designed plants. An indication of the total gasoline making capacity of all Kellogg plants is the fact that approximately one out of every four gallons of gasoline purchased in North America comes from plants built by Kellogg.

Europe, South America and Australia Adopt Fluid Process

It is well known that Fluid catalytic cracking dominates the gasoline industry today. In fact, approximately 63% of the world's catalytic cracking capacity is of this one type.

While this process has been dominant in domestic and Canadian refining since World War II, it is now beginning to play an increasingly important part abroad, where a number of leading refiners are installing catalytic crackers. Indicative of this is the fact that Kellogg has recently completed three fluid plants in the British Isles, is about to complete one in South America, and has started construction on still another as part of a complete refinery project in Australia. In continental Europe an Orthoflow Fluid catalytic cracker has just been completed and another is currently underway.

Two Big Cat Crackers in Philadelphia



This huge (63,000 BPD) Fluid catalytic cracking unit will soon be on stream. Workmen are already installing insulation on the towers of the plant's gas recovery section. (Below) At another site in Philadelphia construction of the largest Fluid catalytic cracker (45,000 BPD reactor throughput) yet to employ Kellogg's unique Orthoflow design is progressing rapidly.

"Why's" as Important as "How's" in Manuals

Although operating manuals are not as dramatic as the actual construction of a plant, properly prepared instructions on the functioning of a refining unit play a vital part in its eventual success.

This is particularly true of refineries outside the U. S. where design specialists are not always immediately available. But to do the job best, the manuals must go beyond explaining the various steps required to start up and operate a plant. They should also be a guide for understanding the overall process—not just the mechanics of running it. They should tell "why's" as well as the "how's."

The way these "why's" and "how's" are told is important. Kellogg is continuously working on the problem of condensing this material into its most convenient form without eliminating any necessary information.

For further information, technical data, etc., on any refining process, write

REFINERY PROCESS DIVISION

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extraction and utilization of butadiene are being developed.

Cabot Carbon, Ltd.

The first unit of Cabot Carbon, Ltd., at Ellesmere Port, Cheshire, went into operation in July 1950 with an annual capacity of 20 million pounds. Construction on a similar second unit was begun in September of the following year and it was formally opened early last April, doubling the capacity of the plant.

Oil black . . . The black is manufactured by incomplete combustion of the liquid hydrocarbon residue from catalytic cracking. This feed is fired as a fine spray mixed with air, and the input rates and relative quantities of hydrocarbon and air determine the grain size of the black. Formerly, the quality was conditioned by furnace temperature; but pilot-scale research carried out in the United States has given a complete set of operating conditions, and a correspondingly closer control of output grade.

The Philblack plant at Avonmouth is now accounting for 50 million pounds of black a year by the furnace combustion process. It makes two grades—20 million pounds of Philblack "A" for use in extruded-rubber products such as cable sheathing, and 30 million pounds of Philblack "O," a high abrasion-resistant black for tires. Both are eminently suitable for compounding with synthetic rubber.

Sulfur Conversion

Elemental sulfur from refinery operations is being produced in substantial tonnages at Stanlow and Fawley, and the Grangemouth refinery in Scotland will shortly be adding a sulfur-conversion unit working on the Claus kiln process.

The Esso Fawley sulfur plant is accounting for 40 long tons of sulfur of a purity of better than 99½ per cent per day. It comes mainly from the H_2S recovered from the lighter products of the cat cracking process from which this gas is removed by washing with diethanolamine (DEA) solution without affecting the remainder of the product. The DEA solution, after boiling to liberate almost pure H_2S gas, is recycled to wash more feed.

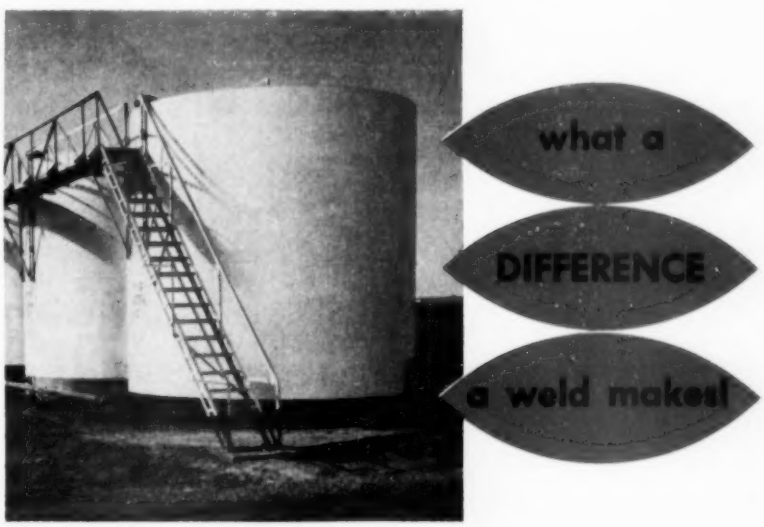
The H_2S produced is burned with a controlled amount of air, and the resulting elemental sulfur is removed from the unconverted gas by scrubbing with liquid sulfur. The sulfur in liquid form is pumped to open tanks where it cools and solidifies. The resulting rock sulfur is broken up, loaded, and shipped in rail cars. The Shell Stanlow sulfur-recovery plant accounts for over 10,000 long tons of this strategic commodity a year.

New Techniques and Processes

Expansion of British refining and petrochemicals has involved development of continuous processes. Demand for new equipment has given an impetus to the creation of a virtually virgin petroleum plant and equipment industry. Also, several pilot plants have been set up with research facilities at the main centers. It is hoped, in time, to develop new techniques and processes, some of which may have a dollar earning capacity by sale of patents to the United States and Canada.

All British petrochemical plants are characterized by a high degree of automatic control, itself an outcome of extended development work done by electronic engineering and instrumentation industries. Productivity, already high in the oil-refining sector of the industry, is higher still in the petrochemical field.

The bulk of locally produced petrochemicals goes into plastics, synthetic detergents, solvents and paints, the automotive industry, and man-made fibers. Last year direct exports of British petroleum chemical products were valued at around £5,000,000 ($12,500,000), or nearly 5 per cent of all shipments from chemical and allied industries.



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Sivalls *welded* lease tanks prevent loss by seepage over the years or leaks at the seams any time. Sivalls gas-tight *welded* tanks let you operate at higher pressures.

Sivalls' cone-bottom feature (optional at extra cost) reduces corrosion because most B S & W can be drawn off through the drain. Eliminates most tank cleaning as well.

In highly corrosive fields, the extra plate thickness of Sivalls' ¼" *welded* tanks adds years of *extra* service.

Sivalls' 500 bbl tank shown above, and most other popular sizes, are normally carried in stock, and are available in plate thicknesses up to 5/16". They're ready to hook up and use on delivery — painted, shop tested, *guaranteed!*

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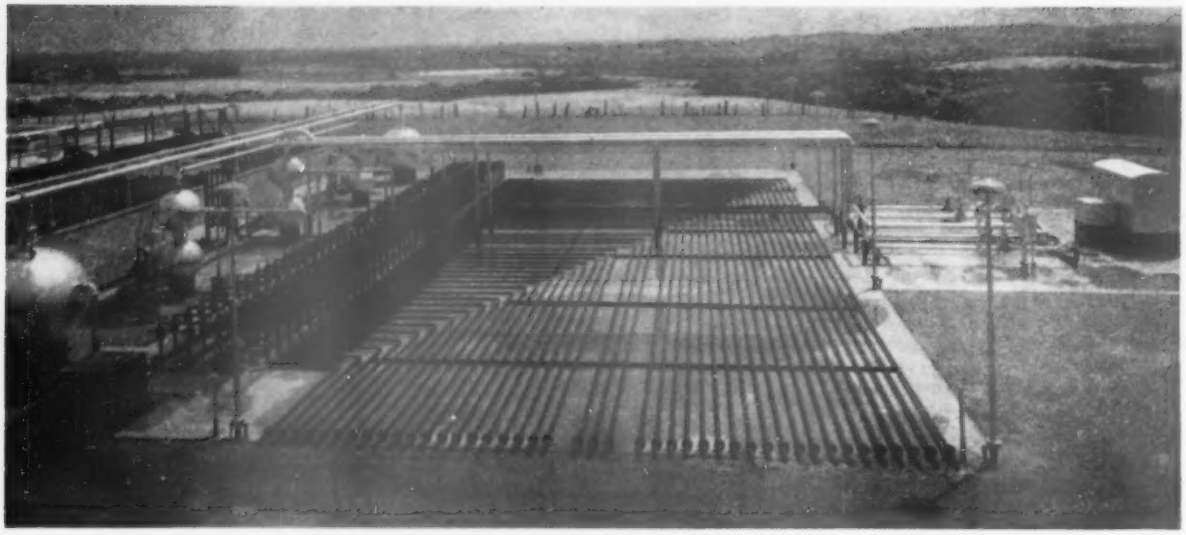


Fig. 1—Wells to be tested are diverted automatically from the gross production headers, which feed to the two flank traps, to either of two test traps. The central trap is connected to a three-well manifold for manual testing of new producers.

Shell's Push-Button Trap Farm

Gross fluid production, percentage water cut, and wet-gas output obtained automatically and recorded on individual well

by D. H. Stormont
West Coast District Editor

COMPLETELY automatic testing of individual wells is being accomplished by Shell Oil Co. at three trap farms in Brea-Olinda field near Los Angeles.

At each installation wells are automatically diverted from a bulk manifold to test traps, where the oil and gas output is separated, metered, and recorded. Frequency and sequence in which wells are switched are preset on individual well switches. The testing period can be preset to extend from 4 to 24 hours, but production data will be recorded for each 4-hour period. All of these operations can be carried on without supervision.

In addition to these automatic facilities a separate manifold, trap and test tank are provided for manual testing of new wells.

Data automatically obtained and recorded on a well while it is undergoing test consist of gross fluid production, percentage water cut, and wet-gas output. Production figures are continuously counted in 0.1-bbl. and 0.1-M.c.f. increments. At the end of each 4-hour period the totalized figures are printed on strip charts, together with the well code number. Percentage water cut is continuously recorded on a strip chart, which likewise receives the well code number at 4-hour intervals.

Limited experience with the fully-automatic well testing facilities indicates the recorded cut and gross fluid readings are very close to manually obtained figures. Accuracy of the automatic gas measuring units is within plus or minus two per cent of the recordings obtained by standard orifice-meter checking equipment.

Primary purpose of the automatic farms is to make possible the securing of more frequent test data, so that performance of individual wells can be

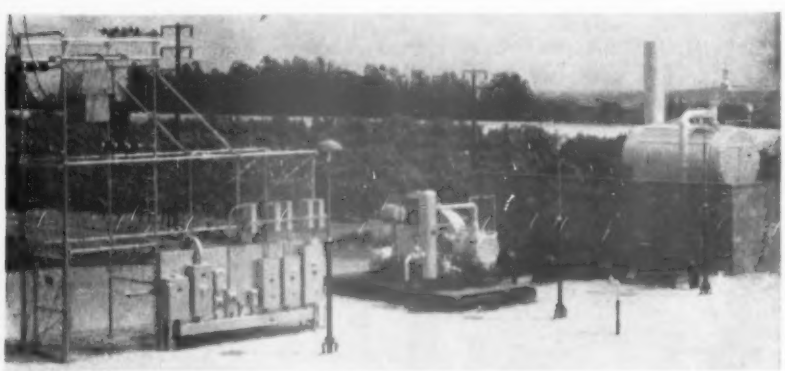
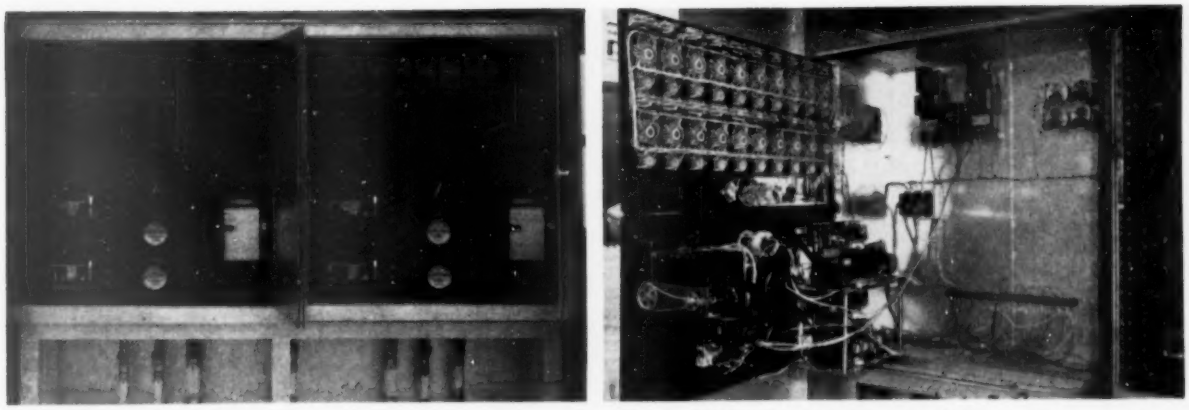


Fig. 2—Transformer station, for reducing 11,000-volt line voltage to 440 volts. In its rear are shown the tank-vapor compressor, centrifugal shipping pumps, and the low-pressure boiler for supplying heat to the wash tanks.



Figs. 3A and 3B—Front and rear views of the control panels, each of which controls the automatic testing of 20 producers.

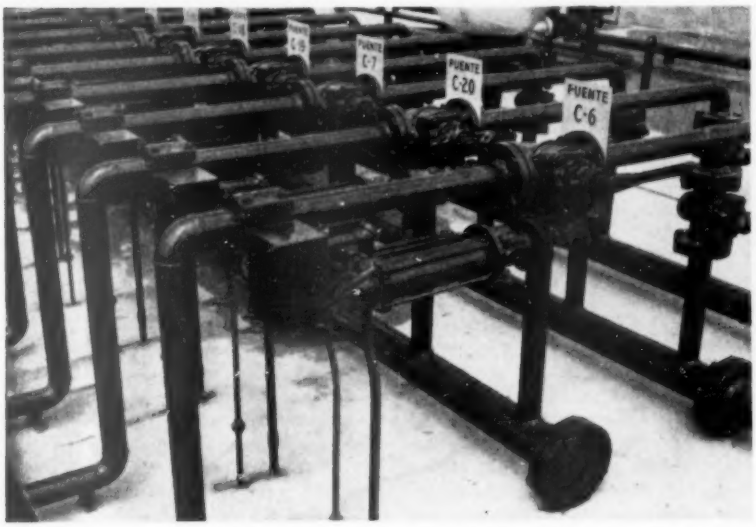


Fig. 4—Three-way air cylinder-operated valves automatically switch wells from the gross production header to the test trap. Solenoid-operated pilot valves which actuate the air cylinders are contained in the explosionproof housing at the near end of the cylinder.

Fig. 5—Fluid leaving the test trap is automatically measured for water content and the total fluid metered. Both the per cent cut and volume are remotely recorded on charts mounted at the control panel.

more closely followed during their producing life. As a general rule each well is now tested once weekly. But because of the farms' automatic features, these data are being obtained without additional lease personnel.

Puente trap farm . . . Facilities at Shell's West Puente lease is representative of the two other completed installations, and of two to be completed on Brea-Olinda leases later this year. This particular lease currently is producing 8,500 bbl. of oil daily. It is expected that it will reach a production peak of 11,000 bbl. daily. Gas production is averaging about 7,000 M.c.f. daily.

As shown in the general-view photos (Fig. 1) of the West Puente farm, flow lines from 40 wells run to two 20-well manifolds. Actually only 30 of these are being used but the remainder of the 40-well capacity will be utilized upon completion of the current development program.

In addition there are three lines for testing newly completed wells. These lead to a three-well manifold, a separator, and a 250-bbl. test tank. As wells are completed they are manually tested in these facilities. After the period of frequent testing is over, they are switched from the completion manifold to their regular place in an automatic manifold.

Under routine conditions flow of a given well is through either of the two manifolds and into either the wet or clean-oil header. From there it goes to the large spherical traps on either flank of the three test traps (Fig. 1).

In each manifold, however, are air cylinder-operated, three-way plug valves for diverting each well from the bulk header to a test header—in the sequence and for the duration established by switching mechanisms installed on the control panel serving that particular manifold.

Wells diverted into the test headers flow to the test separators, each of which is equipped with an Enniscope cut-determining mechanism, a fluid Orth-o-meter, and a meter run containing a Republic special wide-range integrating gas-flow meter. Completing each test installation are a 250-bbl. test tank, for periodic checking of the accuracy of the fluid meter and cut recorder, and a control panel which houses the switching and recording mechanisms.

Also contained in the West Puente tank farm are a 7,000-bbl. wash tank and two 10,000-bbl. stock tanks. This tankage is equipped with vapor-recov-

Fig. 6—Wet gas produced by a well being tested is metered in this gas-flow totalizer, which sends 0.1-M.c.f. signals to an impulse printer-counter at the control panel.

Fig. 7—Automatic water bleeding is accomplished in the two storage tanks. The tank bleeders operate at 6-hour intervals, shutting off when the oil-water interface is contacted.

ery equipment, from which is recovered about 525 M.c.f. of tank vapors daily. These are boosted to 80 psi. in a 75-hp. motor-driven compressor. Crude shipping is performed by two 40-hp. motor-driven centrifugal pumps rated at 900 bbl. per hour each.

Heat for operation of the wash tank is supplied by a 5,000,000-B.t.u., low-pressure steam boiler. Completely automatic, it operates intermittently to maintain a temperature of about 140° F. in the tank.

Purchased electric power is reduced from a line voltage of 11,000 volts to 440 volts for supplying the pumps and compressor. This is further reduced to 110 volts for instrument use and for lighting. All switches and transformers are centralized as shown in Fig. 2.

Automatic operations . . . Each well is represented on the panel board, shown in Fig. 3A and 3B, with individual time and sequence selector switches. These control the duration of the test (0, 4, 8, 12, and 24 hours) and the order in which wells follow each other into the test manifold. Well 1, for example, may be set for a 4-hour test, followed by Well 2 on a 24-hour test, Well 3 for 0 test period, and Well 4 for 8 hours. The order and period of test of individual wells may be changed at will, or the entire sequence may be interrupted for manual gaging as explained later.

A jeweled light below the well code number is illuminated whenever that well is being tested. A master clock, which automatically resets upon the conclusion of each test, indicates the length of time a well has been in test.

These controls automatically function to operate the three-way valves in the test headers, a portion of which is shown in Fig. 4. Solenoid-operated, pilot air valves contained in explosion-proof housings actuate the air cylinders connected to the manifold three-way plug valves.

When a well's production is switched from the bulk header to test, fluid from the test header is routed through the connecting test separator (Fig. 5). Oil and water are removed from near the base of the bottom sphere, contact the electrode of the electronic cut-determining mechanism, pass through the volumetric meter and flow valve, and then travel to the wash tank. Separated gas exists overhead to the 4-in. Robinson meter run, where it is measured and then passed to the wet gas gathering system.

Fluid metering . . . Fluid in passing through the Orth-o-meter drives selsyn motors connected to the meter and to the Enniscope strip-chart cut recorder at the control panel. Gross production as indicated by the fluid meter is transmitted to the control panel by the selsyn motors and 0.1-bbl. signals are sent to the Streeter-Amet impulse printer counter. Per cent water in the fluid is continuously measured and the results, in per cent water cut, recorded on a strip chart mounted on the panel.

Gas measuring . . . The orifice fitting of the gas motor run is connected to a Republic special wide range, integrating, gas flow totalizer (Fig. 6), which sends a 0.1-M.c.f. signal to the Streeter-Amet impulse printer counter located on the control panel. This is the first known instance in which these electrically operated flow meters have been applied to wet-gas service.

So that a greater range of volume of gas could be measured and recorded, two differential-pressure measuring columns are used in place of the normal single meter body. When the gas flow being measured is in the range of 4 to 142.5 M.c.f. per day the low-volume unit sends signals to the integrating flow totalizer. When the flow is between 142.5 and 600 M.c.f. per day the other meter body automatically takes over.

After printing at the end of each test sequence, both the fluid and gas counters are automatically reset to zero and the next well in the sequence is indexed. At the end of each 4-hour period, the three strip charts located on the panel board are printed with the well code number; the figures appearing on the counters indicating the gross fluid flow and gas flow during the period are printed on the respective charts.

Manual gaging provisions . . . So that a manual production test can be run on any well at any time without disturbing the well sequence set up on the control panels, a 20-well master switch was installed. It is used for calibration of the meters and cut recorder, and for periodic checks of their accuracy.

After the master switch is turned to the number corresponding to the well selected for manual testing, the well undergoing test in the automatic manifold is automatically withdrawn from the manifold and the selected well is switched into the manifold. The impulse counters and timers automatically cease their operations during this period. During manual testing, however, the meters and cut recorder continue operation and may be observed and manually recorded for checking and calibration purposes.

When the period of manual testing is concluded and the master switch is reset to the "automatic" position, the well which was initially in the automatic manifold is automatically returned to the manifold for the remainder of its test period. The impulse counters and timers recommence their recording operations and continue until the end of the test period as if the interruption had not occurred.

The automatic gaging and metering provisions were not applied to the storage-shipping tanks. However, provision of automatic water bleeding was made in the two 10,000-bbl. tanks (see Fig. 7). This consists of an Enniscope electronic tank bleeder working through a time clock. At 6-hour intervals the tanks are automatically drained, shutting off automatically when the oil-water interface encounters the sensing electrode.

Rig-Compound Maintenance

(Continued from page 123)

Nature of soap—

Soda or soda lime base; maximum lime soap 5 per cent of total weight of grease; uncombined lime 0.10 per cent maximum. Worked penetration, 190 minimum A.S.T.M.; running torque, ABEC, 60-300 g.-c.m. Leakage, through plate seal, 5 per cent maximum. Left in bearings, 75 per cent minimum.

Choice of seals . . . Almost as important as the properties of the lubricant is the matter of the oil or grease seal employed. The two common types are the rawhide seal and the labyrinth seal. The former consists of a leather or neoprene lip held against the shaft by a garter spring. The lip is turned toward the fluid to be sealed.

The labyrinth consists of a metal ring with several annular grooves which act to form a progressive seal. In other words oil will leak by the inside grooves, be partially trapped in the second groove, further trapped in the third groove, etc. The labyrinth is highly successful where slight leakage is not important. It also forms an automatic grease relief. Should the bearing housing be pumped full of grease the excess will relieve itself. The labyrinth is an excellent means of insuring against overfilling the bearing housing, thereby shortening bearing life.

Labyrinth seals are usually designed with a running clearance of 0.015 to 0.020 in. Having no actual contact with the shaft they do not wear the shaft as so often happens in the case of the rawhide seal.

Bearing Failure

The cause of bearing failure short of life expectancy can usually be attributed to one of the following:

1. Misalignment.
2. Inadequate or unsuitable lubrication.
3. Faulty installation.
4. Peening while bearing is not rotating.
5. Wrong fits.
6. Malformation of bearing seats on shafts or in housings.
7. Defective sealing.
8. Defects of material.

Most bearing men agree that bearing failures occur due to one of the above causes, with the order of frequency about as listed above.

Misalignment imposes serious stresses on the bearing races and rollers, causing a scrubbing action as well as the normal rolling action. The term "self-aligning" applied to a bearing is sometimes misleading. The bearing has a certain capacity for misalignment, true enough, but perfect alignment will assure maximum life.

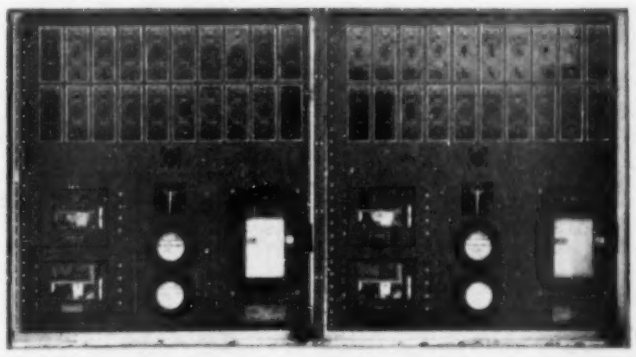
Damage by peening . . . Bearings used under floating or overriding sheaves or sprockets do very little rotating. When the clutch is engaged they are locked up and act merely as a spacer or bushing. Shock loading causes a peening action which in time indents the rollers into the races.

About the only remedy for this frequent source of trouble is to use a bearing of as narrow annular section as possible. Such bearings have more rollers of smaller diameter, resulting in better load distribution on the races and a consequent minimizing of peening.

Less frequent is bearing failure due to improper fit between bearing and shaft or between bearing and housing. General practice calls for a light tap fit of zero to 0.0005 in. interference between bearing bore and shaft on bores of 3 to 6 in. The smaller bearings are usually mounted at zero interference or metal to metal.

It is sometimes found that spherical roller bearings are shrunk on the shaft as tight as 0.003-in. interference. Such installations are almost always doomed

COMPLETE AUTOMATIC WELL GAUGING



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to early failure, since the spherical roller bearing usually has no more than 0.003-in. clearance between rollers and races. The 0.003-in. shrink would remove all that clearance, as the inner race would expand by that amount.

Bearing-housing fits vary to suit the individual conditions. Some installations require a metal-to-metal fit in which the housing can be pulled off the bearing cold, while others require a light tap fit. The amount of interference between the outside diameter of the bearing and the bore of the housing decreases the running clearance of the bearing, however. If the housing is bored 0.0005 in. smaller than the bearing the running clearance will be reduced by that amount.

Importance of proper fit . . . Although manufactured to certain tolerances, no two shafts will be the same diameter at any given point. The same is true of bearings, although the latter are made to far closer tolerances on bore and o.d. than are most shafts.

A careful measurement to determine the bearing fit on a replacement job will always pay dividends in longer bearing life. If a bearing is mounted too loose it will creep, or turn in its mounting. This will result in shaft or housing wear and eventually allow excessive "slap." In the extreme cases shaft breakage has occurred.

An infrequent cause of bearing failure is malformation of bearing seats on the shaft or in the housing. The shoulder against which the bearing locates must have a radius or fillet in the juncture between shaft and shoulder. This radius adds strength to the shaft, for with flexure to which any rotating shaft is subjected a sharp-shouldered shaft would eventually break at that shoulder. It sometimes happens that the radius is made larger than the radius on the bearing. When the bearing is forced against the shoulder the races are squeezed inward at that point, loading the bearing unevenly. Early failure usually results and the cause is sometimes difficult to determine.

It is obvious that seal failure will result in loss of lubricant and bearing failure.

Bearing manufacturers, despite elaborate testing procedure, do occasionally turn out a bearing with defective material. The cases are rare but are worthy of mention.

Chains

Of importance equal to that of bearings in the maintenance picture is roller chain.

The service life of roller chain is directly related to certain factors of design. First, a given size chain running on a given size sprocket will last longer at low speed than it will at high speed. The drilling rig seldom achieves the chain service life predicted by the chain manufacturer because compounding often requires speeds higher than those recommended.

Other reasons appear, also. It is seldom possible to achieve ideal lubrication conditions on the rig. The usual force-fed oil system is subject to clogging with foreign matter, restricting the flow of oil to the chain. The system itself is probably the best to be had, but it must be kept clean to insure maximum chain life. The older system of dip lubrication has long since proved inadequate. The oil simply does not reach the working parts of the chain.

Longer life expectancy . . . The present trend toward fluid drives on rigs should show a marked improvement in chain life due to reduced shock loading. Chain stretch and fatigue are probably due more than 50 per cent to shock. A reduction of the shock will certainly improve chain life.

New developments in chain design will do much to reduce chain costs. One manufacturer is marketing a high-speed chain capable of operating at 5,500 ft. per minute, compared to the 4,000 ft. per minute usually encountered in present-day compounds. This chain is similar in appearance although somewhat different in principle, to silent chain.

The oil employed to lubricate chains should be kept clean and be supplied to the chain in a quantity sufficient for good lubrication. This involves cleaning the pump suction strainer frequently, checking oil lines to see that full flow is being realized, and keeping the chain guard as dustproof and leakproof as possible.

A chain stretches with age, due to shock and fatigue. The common practice of taking out one link and installing a half-link to take up slack is harmful to the sprockets. When the chain has stretched to the point that a half link can be installed it is ready for retirement; for such pitch length is then a little overlength, and the chain no longer fits the sprocket. Under these conditions the load distribution is not equal around the sprocket. One or two teeth are carrying most of the load.

Clutches

Two types of friction clutches are now in general use. One employs a clamp-up principle, either by mechanical linkage or by air. The other is the annular air-tube clutch.

The clamp-up clutch requires occasional adjustment in order to realize maximum service life. The clutch should be adjusted as tightly as possible, still allowing the engaging cone to snap into fully engaged position. Such an adjustment assures maximum load capacity and minimum slippage under load.

Release springs should be renewed at any time the clutch fails to release promptly on disengagement. The splines should be cleaned at the time of disassembly and the friction disks checked for wear.

On mechanical-linkage clamp-up clutches the engaging cone is often operated by an air cylinder and remote-control air valve. On such installations a stop must be provided to prevent any thrust on the throwout bearing after the clutch is engaged. The stop is usually adjustable and should be checked frequently. The throwout bearing is not designed to withstand continual thrust but, rather, only the momentary thrust necessary for clutch engagement.

No adjustment on air clutch . . . Air clutches require no adjustment within themselves, although the mention of release springs made above applies also to clamp-up-type air clutches.

On any air clutch successful operation depends upon the ability to get the air into the clutch as rapidly as possible on engagement and to release it completely in the very minimum of time. Any delay in either phase can cause heating and damage to the unit. Adequate air volume at 100 to 125 psi. pressure should be maintained.

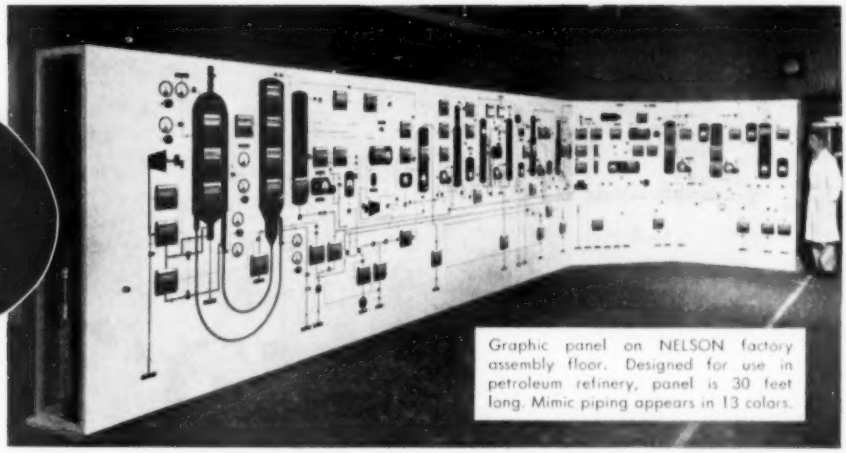
The air-operating valves should be kept in good repair so that air can reach the clutch rapidly. Quick-release valves should also be kept in good condition so that the air can be dumped from the clutch as rapidly as possible.

If at any time an air clutch fails to carry a normal load it is wise to install a pressure gage on the clutch proper (all shafts dead) and check the air pressure at the clutch. The speed with which the pressure builds up will indicate whether the air line is restricted and also whether the control valve is delivering full rated pressure. Insufficient air pressure will, of course, result in clutch slippage and early damage.

It is often found that oil and grease have invaded the clutch due to faulty oil seals. The friction disks or shoes soon become impregnated with oil or grease and lose much of their effectiveness. Clutch slippage results. Replacements of friction material and oil seal are then in order.

Air-control valves, rotary air seals, and certain types of air clutches re-

ONE STOP SERVICE



Graphic panel on NELSON factory assembly floor. Designed for use in petroleum refinery, panel is 30 feet long. Mimic piping appears in 13 colors.

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quire lubrication in the air stream. Clutches utilizing chevron-type packing depend heavily on lubricated air to maintain effective sealing. Lubricators must be kept filled and in working order if air valves, etc., are to render satisfactory service.

Replacements

Bearing and clutch replacement require certain simple precautions for maximum service life. Whenever possible a bearing should be pressed into position, using white lead on the shaft. Shaft diameter and bearing bore should be checked with micrometers to determine the class of fit involved.

Should heating of the bearing be necessary it should be done in an oil bath of not over 250° F. temperature. The use of an acetylene torch to heat ball and roller bearings has always been frowned upon by bearing manufacturers but is occasionally necessary in the field. One word of caution on this score: Keep the torch moving rapidly around the bearing. It is very easily warped by uneven heating.

Clutch-hub installation offers similar problems. Again the bore and shaft diameter should be checked, the shaft coated with white lead, and checked for burrs. On larger hubs two torches should be used simultaneously to assure even heat distribution. Keyway depth should be checked for key clearance before heating commences.

The above precautions are elementary but important. The writer has known of several troublesome repair jobs caused by overlooking one of the points mentioned.

Rig compound maintenance may be boiled down to the need for proper alignment of components, cleanliness, ample lubrication, and good measure of good old horse sense. Better crew education will result in lower maintenance costs, and eventually we should approach stationary-plant maintenance costs on the rigs.

"Hey, fellows—suppose this is th' trouble?"

Acknowledgment

Acknowledgment is hereby made of the valuable assistance of E. L. Cowan, West Texas Division maintenance superintendent for Rowand Drilling Co., in the preparation of this article.

In-Line Layout at Multipurpose Terminal

(Continued from page 127)

designed so that in addition to its present use, it could handle regeneration of the Sugar Creek-Sioux Falls dehydration plant if and when it may be constructed.

Meter and Proving-Tank Area

Three sets of meters are located in the area. Each set of meters serves one of the functions of metering outgoing shipments, and the incoming product from the Neodesha-Sugar Creek line. Each set of meters is calibrated by a 30-bbl. proving tank.

In order to minimize the interface mixtures between systems, each line has its own sump tank and sump pump. Each sump pump in turn is so connected that it can be utilized in the evacuation of the station piping of the pipe line it serves.

The main station-control panel, electrical control room, and offices of operator and chief engineer are located in the operating area.

The station operator's office is so arranged that he can observe the main station-control panel from his desk. The panel indicates the operation of all main-line equipment as well as important operating pressures. The main-line units can be stopped or locked out at the panel but must be started in the pump room.

The electrical control room houses the main starting cubicles and cutouts. This room contains nonexplosionproof equipment and consequently is pressurized continuously. Outside air is taken in and tempered by an automatic heating coil to control the temperature of the pressuring air.

Karl Fischer titration equipment for determining the amount of water in refined products is also located in this area. This titration is performed by the station engineers in order to monitor the effectiveness of the dehydration plant.

Pumps

The main pumping units for the Sugar Creek-Dubuque line have been engineered and selected to give maximum flexibility for a wide range of throughputs.

Pump efficiencies of 70 per cent or greater are maintained through a volume range of 24,000 to 70,000 bbl. per day. If line rates need to be increased above this range, only required changes are modification of present pump impellers and the installation of two additional units. The present pump cases and motors are utilized across the entire range without modification.

Pump facilities are arranged so that a common motor room is used for the motors driving the pumps of both the Sioux Falls and the Dubuque lines.

Pumps are equipped with mechanical seals and separated from the motors by flexible couplings and a fire wall. Units are started by push-button control in the pump room.

Electric motors . . . Motors are of open type (nonexplosionproof). The ambient temperature of the motor room is automatically controlled by two roof-mounted exhaust fans. Ventilation is drawn in from the south end of the motor down across the motors. It exhausts out through exhaust blowers.

Main-line pumps for both lines are of the centrifugal type, with 6-in. suction and 4-in. discharge.

The motors for both lines are 2,300 volt, 3,600 r.p.m.

The Dubuque line has three units, a two-stage unit driven by a 300-hp. motor and two four-stage units, one of which is driven by a 400-hp. motor and the other by a 500-hp. motor. Provision is made for possible future addition of two more units to bring the line up to ultimate capacity.

The Sioux Falls line has four units, a two-stage unit driven by a 200-hp. motor, and three four-stage units. One is driven by a 300-hp. motor and the other two by 400-hp. motors.

Construction of the main station building was done by S. Patti, general contractor. Erection of dehydration plant and installation of the main piping and machinery were undertaken by Refinery Engineering Co.

Main-line construction was delayed by the steel strike in 1952, consequently a large portion of pipe laying was done in the winter. The overland line was contracted by Sheehan Pipe Line Construction Co. and O. R. Burden Construction Corp. Several river crossings were constructed by Ray L. Smith & Son, Inc. Stringing was contracted by Parkhill Truck Co.

Less than 3 miles from the station, the Missouri River crossing was built by Pentzien, Inc. This crossing, about 2,000 ft. in length, between overbends, was constructed by a single length of 12-in. seamless pipe with ½-in. wall.

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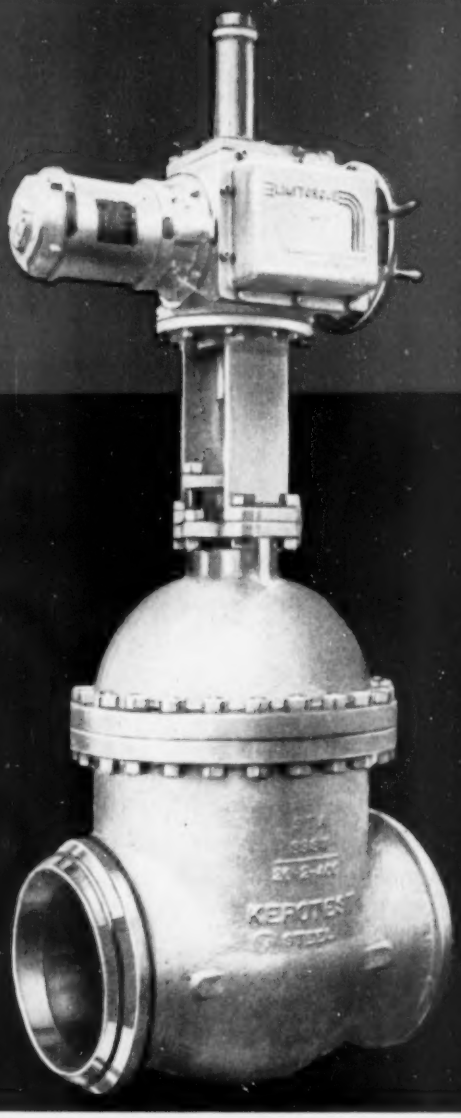

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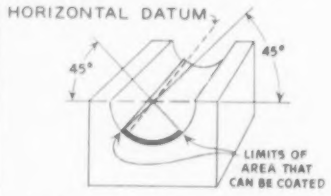
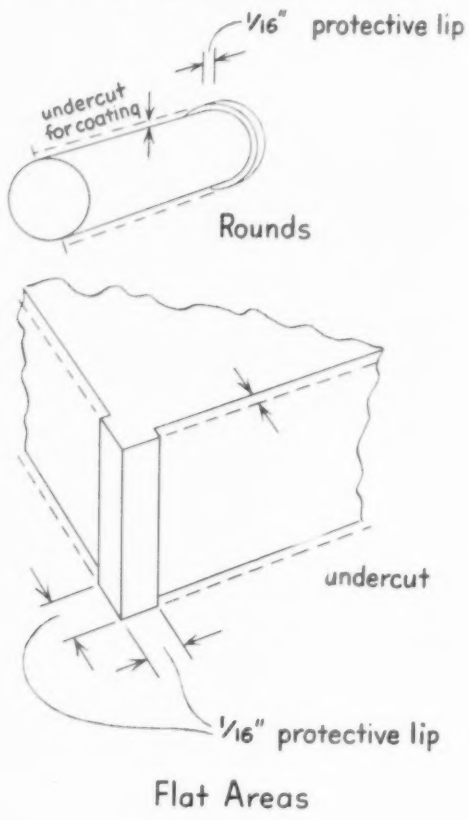
SOME FACTS ABOUT FLAME-PLATED TUNGSTEN CARBIDE COATINGS

Composition	92% tungsten carbide, 8% cobalt	
Hardness	1200 to 1500 Vickers (300 gm. load)	
Coating Thickness	Maximum - 0.020 in., Minimum - 0.0005 in.	
Surface (As Coated)	125 microinches rms (Brush Analyzer)	
Surface (After Finishing)	2 microinches rms (Brush Analyzer)	
Base Materials	Tool steels, cast iron, aluminum, copper brass, bronze, titanium, magnesium	
Temperature of Base Piece during Application of Coating	Less than 200 deg. centigrade	
* Size of Base Piece	Round O.D. - from 1/8 in. to 6.0 in. Length - to 40 in.	Flat As coated - 6 in. by 40 in. Finish-ground - 3/4 in. by 40 in.
* Shape of Base Piece	Externally -- any area at no greater than 45° from a horizontal datum  Inside cylinder walls -- Coating can be deposited to a depth equal to the diameter of the hole.	

* Other sizes and shapes can be handled with special jigs and fixtures.

PREPARATION OF PART FOR FLAME-PLATING



New method of hard-coating metal parts

Flame-Plating, even with tungsten carbide, possible at base-metal temperature of 400° F.

FLAME-PLATING is a method of applying powdered metals — like tungsten carbide—to metal parts. The deposit is made in the form of a coating, and can be applied in thicknesses ranging from 0.0005 to 0.020 in. The coating is not diluted in any way.

One of the features of this new process is that the temperature of the base metal does not exceed 400° F. during the plating operation—even when tungsten carbide is being deposited. The low-temperature deposition practically eliminates any possibility of a change in the properties of the metal being plated, and reduces to a minimum the chance that the part might warp.

Flat areas, cylinders, holes, and parts having various shapes and contours can be coated by the new process, developed by Linde Air Products Co. Surfaces up to 6 in. wide and 40 in. long can be handled. The plated part can be used as coated or ground to a mirror finish.

Parts Flame-Plated with tungsten carbide have all of the desirable properties of sintered tungsten carbide, such as resistance to abrasion and frictional wear, and in addition, have a lower modulus of elasticity, and greater resistance to impact and thermal shock. Metals other than tungsten carbide have also been deposited by this method.

Applications . . . Flame-Plating is applicable wherever an undiluted coating of tungsten carbide is required to protect metal parts from severe abrasion and frictional wear. The decision as to when to use this new process will have to be based on a number of factors. The cost will fall somewhere between the cost of a hard-faced part and a sintered tungsten carbide. Of course, cost must be balanced against the service life.

What metals? . . . Through use of the Flame-Plating process, tungsten carbide can be deposited on almost any base metal. Steels of all types, cast iron, aluminum, copper, brass, bronze, titanium, and magnesium have all been coated successfully.

The size of the parts that can be treated is limited by the handling equipment available at the present time. These limitations will be relaxed as the equipment is improved. The areas that can be coated vary with the shape of the part. Here is a quick summary of just what can be done right now:

Flat surfaces 6 in. wide and up to 40 in. long can be plated in thicknesses up to 0.020 in., provided the part is to be used in the as-coated condition. If the part is to be finish-

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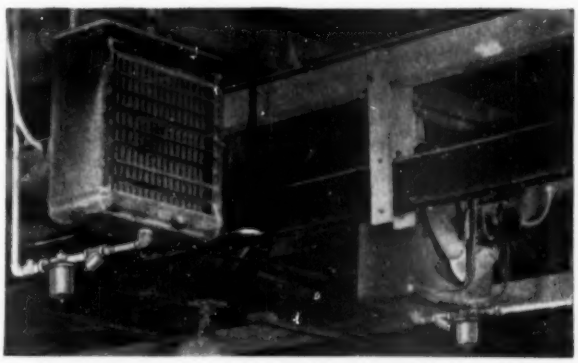

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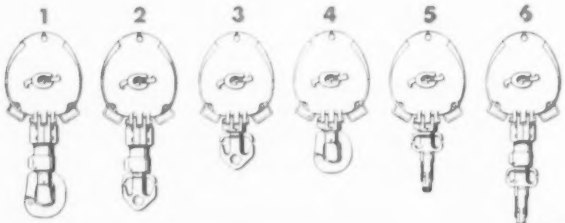

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ground, the width limitation is ¾ in.

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Holes or internal areas of cylinders can be plated to a depth equal to the diameter. A 1-in. hole can be plated to a depth of 1 in.

Irregular-shaped objects can also be handled. The width and length limitations are the same as for cylindrical and flat areas. The rule on irregular-shaped objects is that any area that can be covered directly from the horizontal plane to an angle no greater than 45° from the horizontal can be successfully plated.

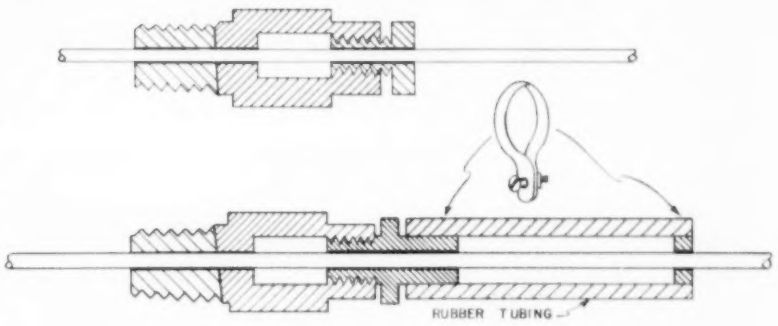
Preparation of parts . . . The parts to be plated should be undercut just deep enough to allow for the desired thickness of the coating. It is advisable to leave a small protective lip at any edge where the part may be subjected to abuse or where two plated surfaces are at right angles to each other.

How thick a coating? . . . Although the maximum thickness obtainable with a plated coating is 0.020 in., few applications would require a thickness of over 0.005 in. A coating thickness of a few thousandths of an inch will resist mechanical and thermal shock to a much greater degree than will a thickness of 0.010 or 0.020 in. A coating thickness of 0.001 in. over the allowable wear tolerance is sufficient in most instances.

If the part is to be finish-ground an excess coating of 0.004 in. is deposited. However, it may be desirable to use the as-coated surface. This surface is 125 microinches r.m.s., as measured by a Brush analyzer.

Finish grinding . . . A plated surface can be ground to a finish of approximately 2 microinches r.m.s. The surface of a coating that has been finish-ground appears to have a certain amount of microscopic porosity. These surface pores are extremely shallow and do not have a detrimental effect on the wear qualities of the coating.

Resinoid-bonded diamond wheels are the only grinding wheels suitable for finishing a Flame-Plated surface. A 100-mesh wheel should be used for rough-grinding and a 400-mesh wheel for finish-grinding when no more than 0.0005 in. is to be removed. Before grinding, the flow of coolant should be adjusted so that the part is flooded.



Use of rubber tubing improves operation of interface level controllers.

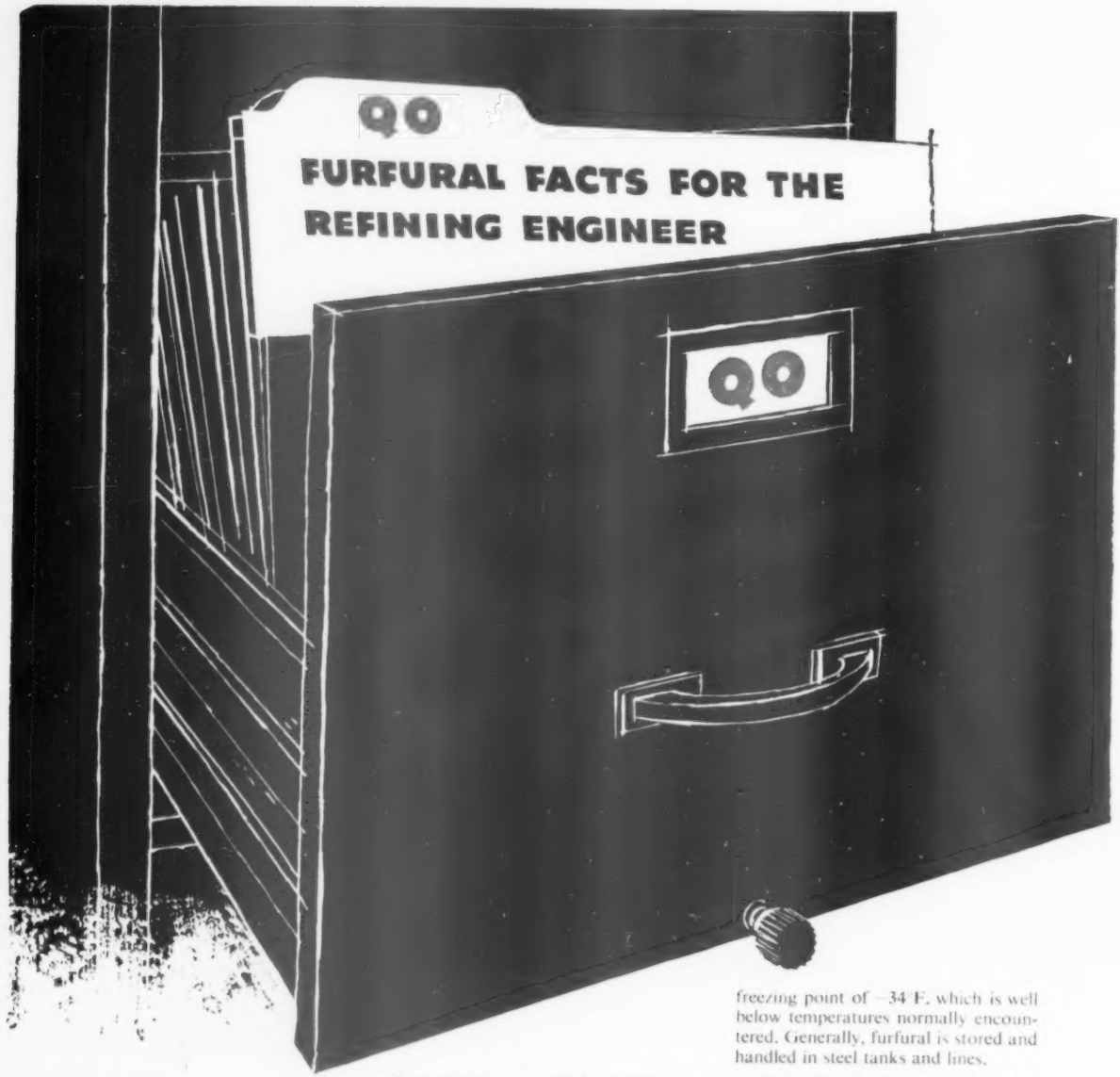
Rubber tubing helps improve level control

IN connection with laboratory work on liquid-liquid extraction, better operation of liquid interface level controllers was made possible by using a section of rubber tubing as a liquid seal and torque tube. Operation of the liquid-level controllers without the tubing was too erratic. This idea permitted use of existing controls through the torsion tube effect obtained on the air control. An estimated saving of some $400 for valves and relays and installation cost was achieved on the four level controllers involved.

Fire protection at solvents laboratory

ALL fire-safety elements installed at the California Research Corp. solvents and thinners laboratory at El Segundo may be seen in this photo. On the ceiling (top, left) is a temperature-rate-of-rise element which detects a fire in the space and automatically trips the six 75-lb. cylinders of carbon dioxide located in the building's basement. The fire-smothering agent is discharged into the lab from multijet nozzles, one of which is mounted to the pipe on the wall (left, center). Note the 15-lb. Kidde carbon dioxide portable (bottom, right) for first-aid fire fighting. Located above the exit door is the compartment containing the fire blanket and the water-shower device. By sliding an arm through the loop and pulling down, water would engulf a lab technician with clothing of fire. Equally simple to operate is the release device for the blanket; a shove on the paddle-like handle (directly above the door) causes the blanket to be dropped from cabinet, open, and ready for use.

Solvent laboratory of California Research Corp. at El Segundo, showing fire-protection devices.



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3. STABILITY: Under the conditions encountered in refining, furfural has a high degree of stability, as shown by the low solvent losses in operating plants around the world.

4. STORAGE: It is not necessary to use special handling precautions for cold weather operation since furfural has a freezing point of −34 F. which is well below temperatures normally encountered. Generally, furfural is stored and handled in steel tanks and lines.

5. SAFETY: Furfural has a safety record extending over 30 years of industrial use. It has a high flash point (150-160 F.), and a vapor pressure of 8 mm. Hg at 39,9 C.

6. COST: Furfural is low in price, and with high recovery, overall solvent costs are attractively low.

7. AVAILABILITY: Large quantities of furfural are produced the year around at three plants from raw materials which are replaceable yearly.

If you would like to know more about the properties of furfural, write for our Bulletin 203 "Physical Data on Furfural."

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SPECIFIC SPEED, CENTRIFUGAL COMPRESSORS—2

How to Calculate Specific Speed

by Harold Woodhouse

THE concept of specific speed, as applied to the centrifugal compressor, was introduced in the preceding installment. It was noted that the ratio:

$$D_2/D_1$$

is the g r e a t e s t single factor influencing the specific speed. In this ratio:

D_2 = outside diameter of the impeller.

D_1 = inlet eye diameter of the impeller.

Impeller Types

Typical cross-section of various impellers in common use are shown in Fig. 1.

The double-suction radial is illustrated, as it has been used in pipeline compressor stations, although it has now been displaced entirely in new installations by the single-suction overhung impeller type. The Francis type can also be made double suction and is in common use in the centrifugal pump field.

The specific speed of a double-suction impeller is obtained by halving the flow and then proceeding as for a single suction.

The ratios of D_2/D_1 for the various types may roughly be taken as follows (there is no sharp demarcation line between the types and some overlapping will occur):

Impeller type—	D_2/D_1
Radial	2.0 — 3.0
Francis	1.2 — 2.0
Mixed flow (machined or Birmann type)	1.2 — 1.7
Mixed flow (standard cast or similarly fabricated construction)	1.0 — 1.2

The author is chief engineer, Dean Hill Pump Co.

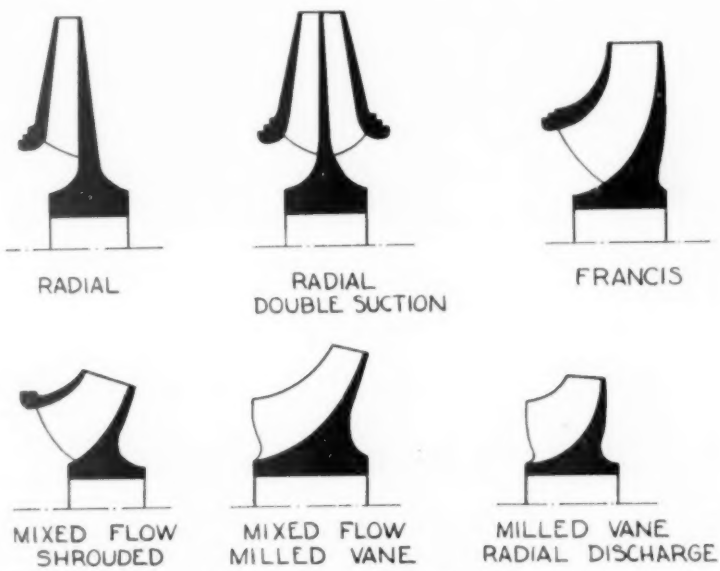


Fig. 1—Cross-sections of impellers in common use.

Impeller Tip Speed

Before the specific speed can be calculated on a general basis, two other assumptions must be made: (1) a value for the pressure coefficient must be assumed and (2) a limiting value set for the impeller tip speed U_2.

In the equation:

$$H = KU_2^2/g \qquad (1)$$

where:

H = actual head developed per stage, on test

U_2 = tip speed of outside diameter of impeller

K = pressure coefficient

From which the pressure coefficient, as based on test data, is:

$$K = Hg/U_2^2 \qquad (2)$$

For an untried design K must be assumed. In each case, other than for the machined impeller, it will be taken at the average value of 0.53.

The limiting value of U_2 for all types, other than the machined impeller, is taken as that figure resulting from the use of a 40-in. o.d. impeller rotating at 3,600 r.p.m. which works out as 629 ft. per second.

This may seem to be a rather conservative figure even though the impellers used are generally castings or the same aerodynamic design in a fabricated, forged, or cast and fabricated construction. If, however, a check is made of the tip speeds of pipe-line centrifugals now in service it will be found that the values for U_2 do not much exceed 500 ft. per second, even for 5,000-r.p.m. units and frequently are below 500 ft. per second.

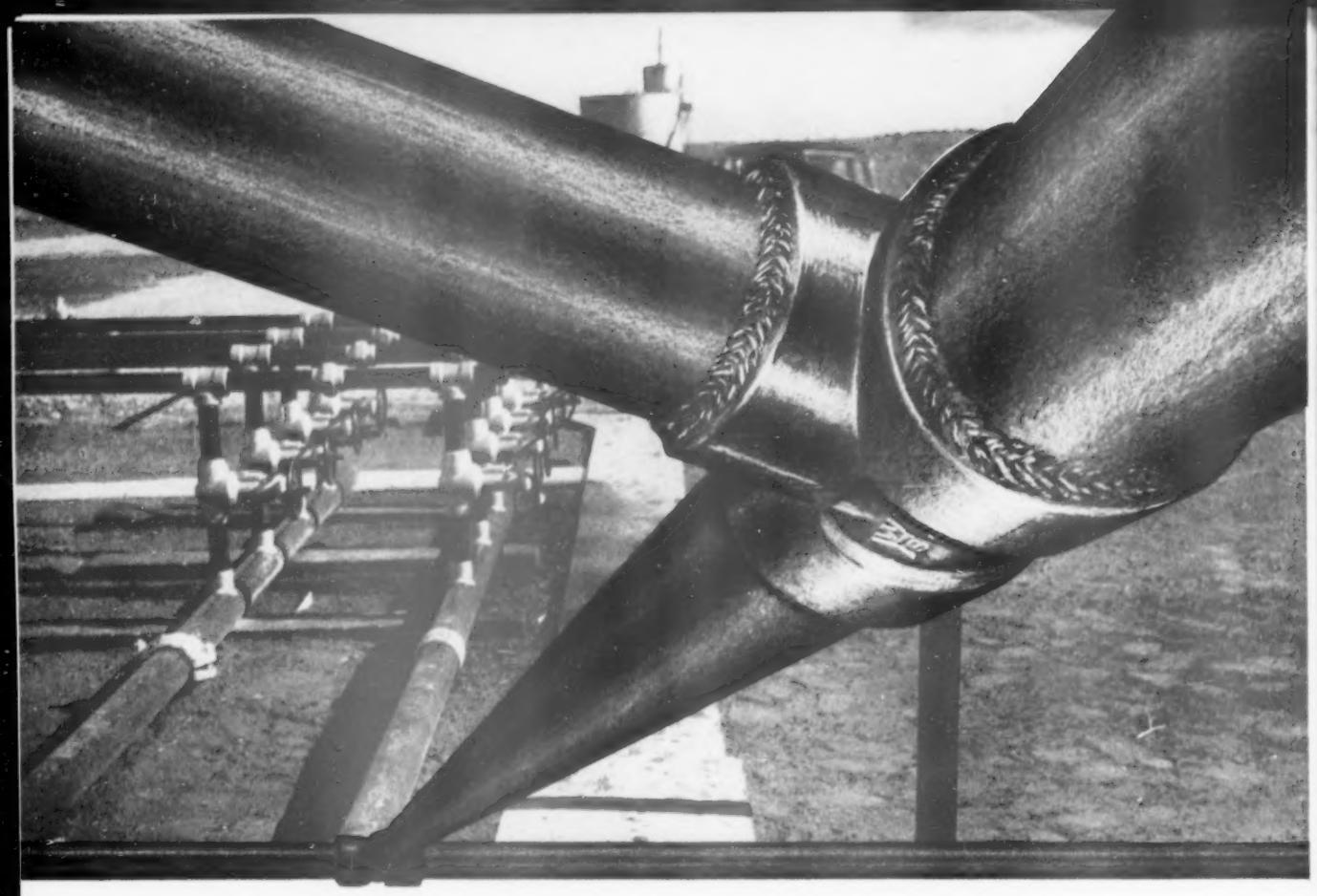
For a typical natural gas having approximately the following characteristics:

n = 1.28

Supercompressibility Z = 1.5 per cent per 100 psi. at suction pressure.

Inlet temperature = 60° F. and based on standard.

Conditions of 15.025 psia. and 60° F.



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INSTRUMENTS

Effective Characteristics—What They Mean in Control

by C. F. Woods

IN the first installment of this series the inherent or design characteristics in control valves were discussed. An interesting comparison is presented by establishing the theoretical **effective** characteristics of valves as applied to this type of control.

Fig. 1 shows a typical pump head-line drop curve for varying rates of pumping. The line "X-Y," for example, represents the pressure drop across the valve (340 psi.) when pumping 4,300 g.p.m. through a typical 85-mile section.

Combining this chart with Fig. 1 of installment No. 1 of this series to prepare Fig. 2 we observe the effective (theoretical) valve flow characteristics of the B-2 4.2 per cent plug, and the B-3 "linear" plug.

Fig. 3 shows the same valves' effective (theoretical) pressure control characteristics.

Although it is interesting to note that, below 5,000 g.p.m., the B-2 has to move twice as far, per incremental correction, as the B-3 plug, these curves really expose the following basic ideas:

1. The real control job is done as requirements go below about 90 per cent of full flow. (About 5,000 g.p.m. is this example.)

2. It is there that linearity of response is needed.

Author is with Minneapolis-Honeywell Regulator Co., Dallas. Portion of paper presented at A.S.M.E. Kansas City meeting.

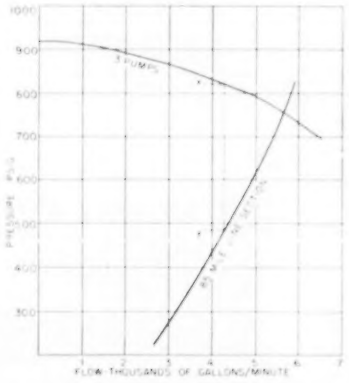

Fig. 1—Pump-head line-drop curves.

3. **Once within the control range,** either valve theoretically will perform with equal results, since both curves are essentially linear. (Higher turbulence in the B-2 4.2 per cent plug may cause serious discontinuity of its curve as it nears the closed position.)

The real need, then, for a control valve in this application is simply to **get it into control range in time to prevent upsets.**

By inspection, it may be seen that the resultant control effect from the linear plug will match that of the percentage plug, **if it can be brought into the control band fast enough,** and be made to hold stable at control conditions. This has not previously been held possible.

The initial compromise on the percentage plug has caused yet another compromise, perhaps not too clearly recognized today.

Because of the attendant turbulence, frictional, and drag effects of a percentage plug, the vertical stem forces are quite high, relatively, as are the torsional forces on the stem. These forces are satisfactorily overcome by using larger diaphragm areas and higher spring force-diaphragm pressure relationships. But this causes the valve motor to act even slower. With the larger volume diaphragm bowl, and the greater mass of air (at the higher pressure) the response is not as fast as it might be.

It would seem, therefore, that if a linear plug could be designed that would have low power requirements (because of small dynamic unbalance and less turbulence) then speeding it up would be our only problem.

Conventional double-ported valves, with seating surfaces, have always been made with one of the plugs smaller than the other. Fig. 4 shows such construction. Of necessity, the seat rings must be inserted in the web before the plug is inserted. The plug must be made so that one of the disks is small enough to go through the other seat ring, in order to assemble the valve for use. This requirement has always caused such a design to be only semibalanced. For example, Fig. 4, the upward force is less than the downward force because the upstream pressure is pushing against a smaller effective area.

Valves without seating surfaces, if properly designed, can be made fully balanced, and require considerably less power to position.

Fig. 4—Conventional contoured double-seated disk.

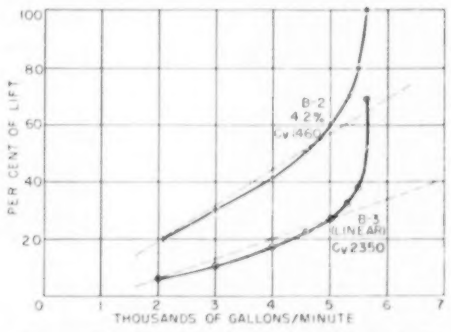

Fig. 2—Effective flow characteristics (theoretical).

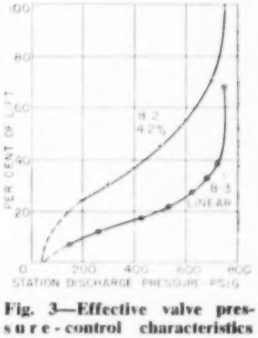

Fig. 3—Effective valve pressure-control characteristics (theoretical).

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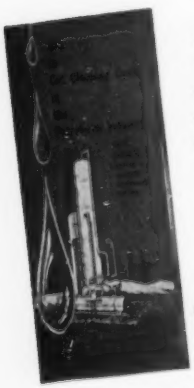

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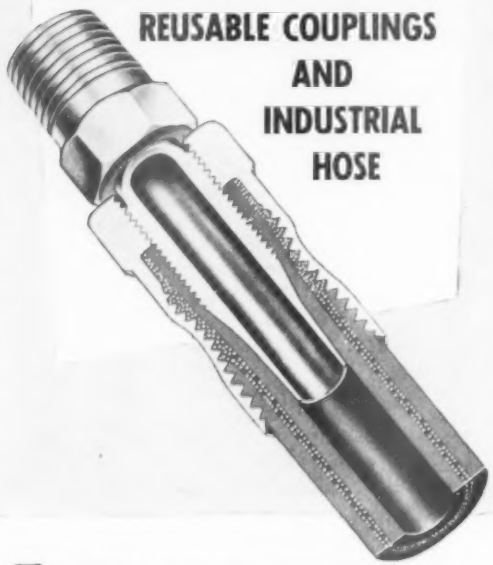

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Controlling Corrosion*

THE use of expendable metal anodes to prevent pipe-line corrosion has been discussed in the last two installments of this series. This discussion is continued here.

Anode installation . . . When magnesium anodes are installed in connection with the regular maintenance and repair program of the pipe line, there is no necessity for having a "profile" or other special tests. Any time it becomes necessary to replace a short piece of line, two or three anodes or one anode for each 20-ft. joint can be installed at the same time in the same ditch with the pipe (Fig. 27).

Once the field crews have been shown how to make the installation, they can continue by themselves. There is no need for a corrosion engineer to be on hand for each individual job.

If some particular spot along the pipe line is developing pit-hole leaks, then a single 8-lb. magnesium anode can be installed at the time the pit-hole saddle is attached (Fig. 28). Once again, the field crews repairing the leak can make the installation of the anode.

With expendable anode installations the deliberate use of insulated joints, such as Dresser couplings and flanges, may became a very desirable feature. By properly isolating various sections of the line, one from the other, it is often possible to protect the line against corrosion without affecting other sections not requiring protection, and perhaps even make it possible to use fewer anodes to secure the desired protection. This is particularly true on distribution systems.

Expendable magnesium anodes can be extremely valuable to prevent the corrosion of coated pipe on both transmission and distribution piping but particularly on distribution systems. Fig. 29 shows the cross-section at a pipe wall of an insulated line having two small defects in the coating, called "holidays." Any galvanic currents flowing in the pipe line will be concentrated at these places where there is no barrier to the flow of the current from the pipe to the ground, with the result that extreme and rapid pitting may occur. By installing a magnesium anode and connecting it to the coated pipe (Fig. 30), it is possible to prevent the flow of current from the pipe to soil at these holidays, and instead, force current to flow from the magnesium anode to the ground, through the hole in the coating onto the pipe line, returning to the magnesium anode through the insulated wire. The magnesium anode will corrode instead of the pipe.

*Taken from a Manual on Underground Corrosion, Columbia Gas System Service Corp. Figure numbers used in the series are progressive.

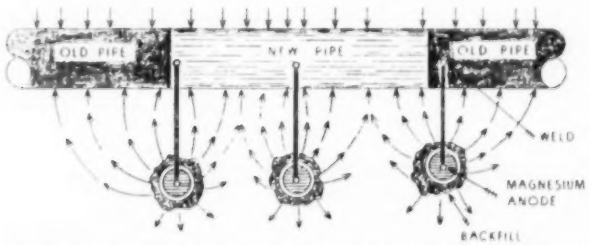


Fig. 27—Cathodic protection—Magnesium anodes to protect old and new pipe line.

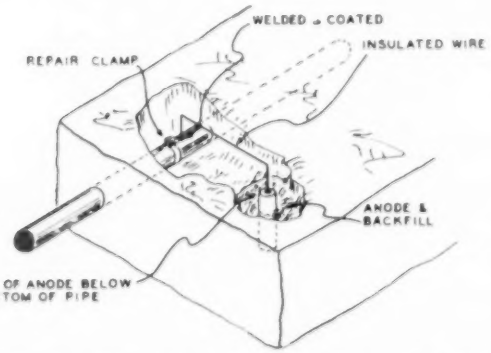


Fig. 28—Cathodic protection—Single-anode installation in leak-repair bell hole.

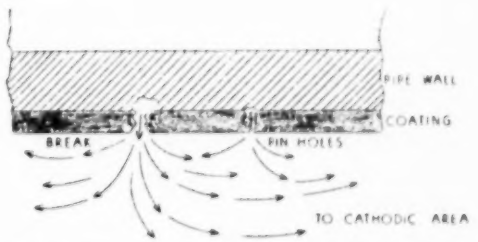


Fig. 29—Concentration of corrosion at breaks and pin holes in coating.

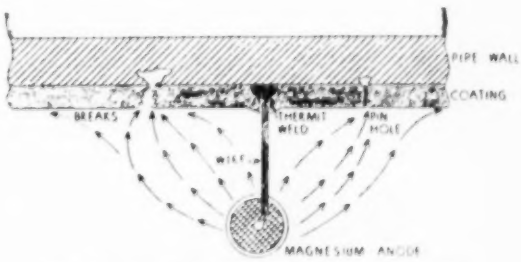
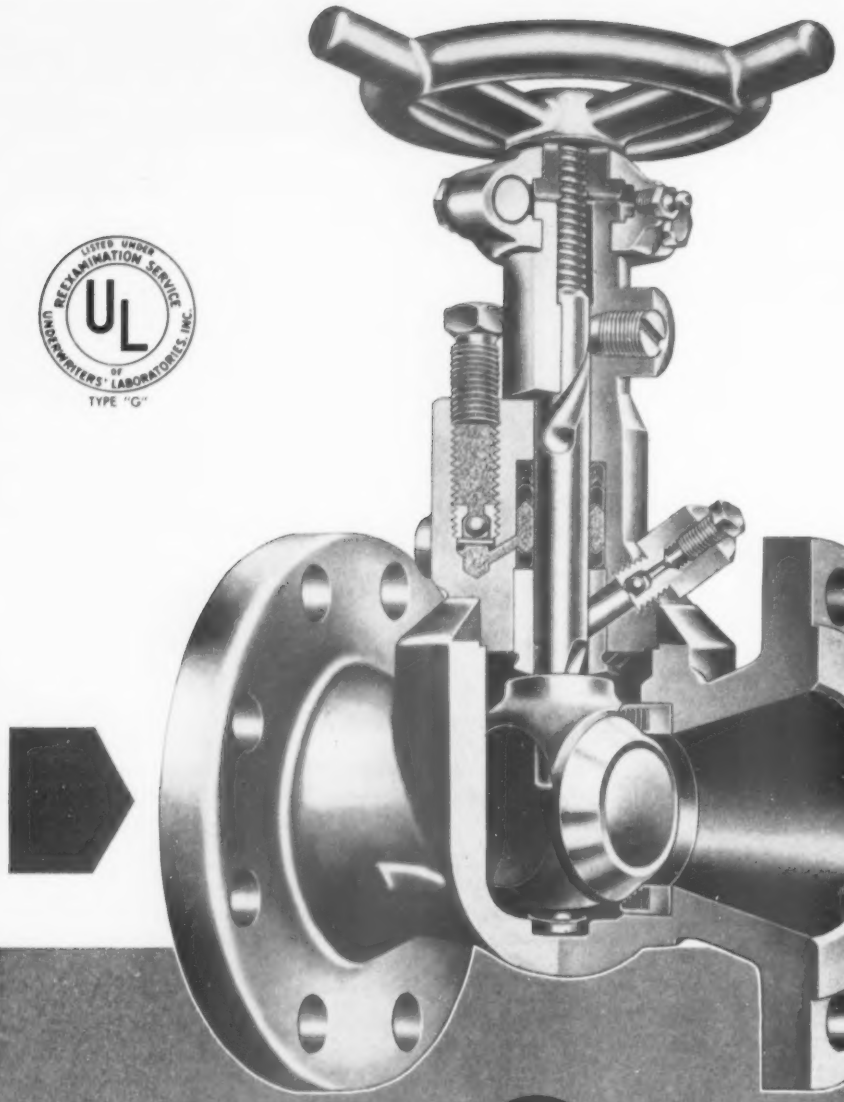


Fig. 30—Pipe protection with coating and anodes.



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ASPHALT ANALYSIS—4

Refractive Index Can Be a Useful Tool

by R. N. Traxler* and H. E. Schweyer†

IT has been noted that refractive indexes of mixtures (asphalt and petroleum oil) can be determined as being directly proportional to composition expressed as per cent by volume.

Data are given in Table 1 for a variety of asphalts tested by the procedure given here. The validity of the method is illustrated in Fig. 1 for Residua D and G. The data for airblown asphalt A exemplifies the application of the method to a hard asphalt.

Determining Refractive Index

1. Scope

This method applies to the determination of the refractive index of asphaltic materials that are so dark or so viscous as to preclude direct readings of RI.

2. Basis

This method of test is based upon the fact, determined experimentally, that the refractive indexes of a series of cutback mixtures, made from any one asphalt and a petroleum oil, are additive if the composition is expressed as per cent by volume.

3. Procedure

Two mixtures, containing approximately 20 and 40 per cent by volume of asphalt are made up by weighing accurately about 3 g. of asphalt into two 25-ml. Erlenmeyer flasks. Approximately 10 ml. of a light, highly paraffinic petroleum oil of known density is added to one flask and approximately 5 ml. is pipetted into the second flask and the actual weights of oil determined. Since the amounts of each ingredient are known by accurate weighing, an exact calculation of the volume composition of each cutback can be made using known density of the components. (See following installments.) The asphalt and oil are then stirred together, heating on a hot plate if necessary. The refractive indexes of the two cutbacks and the petroleum oil are measured at 70° C. (158° F.) and the three results plotted against volume composition on arithmetic cross-section paper. A straight line connecting the three points is extrapolated to the 100 per cent asphalt ordinate, and the RI of the asphalt thereby obtained. If the data are not on a straight line, additional cutbacks of other composition can be made, or the entire analysis can be repeated. An alternative method of checking the results is to make a second series of cutbacks using a different base oil (preferably with an RI greater than the sample). The plotted lines for these two mixtures must intersect at zero abscissa. This method may be required when the sample is too dark for satisfactory readings for the 40 per cent asphalt cutback. In such cases, the use of higher percentages of petroleum oil is required; but the potential error of extrapolation is increased. The latter can be minimized by making a second series of cutbacks and determining the intersection of the two plots.

In installments to follow the calculation will be given for determining per cent by volume composition of asphalt and oil in the mixture. Plots will also be presented of empirical relation between: (1) refractive index and density and (2) density and carbon/hydrogen ratio for various components of asphalts. These empirical relations aid in determining the types of compounds that may be present.

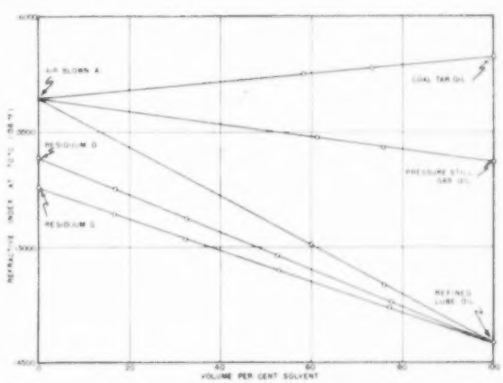

Fig. 1—Application of method for determining refractive index of dark samples.

TABLE 1—REFRACTIVE INDEX DATA ON ASPHALTIC MATERIALS

Source process—	A		B	C		D			E	
	Resid.	Air blown	Air blown	Resid.	Air blown	Resid.	Air blown	Vacuum	Resid.	Air blown
Viscosity* at 25° C. (77° F.) megapoises	0.0036	1,360	360	0.0046	4.4	0.0094	4.6	33	0.029	3.2
Soft. point, R&B:										
°C.		138.9	86.1		55.0		52.8	63.9		50.0
°F.		282	187		131		127	147		122
A.S.T.M. penetration, 25° C., 100 g.—5 sec.		18	17		55		49	15		50
Density, 25° C. (77° F.)	0.962	0.987	1.042	0.995	1.022	0.982	1.011	1.027	0.987	1.016
RI/70° C. (158° F.)	1.5315	1.5600	1.0658	1.5595	1.5780	1.5382	1.5590	1.6048	1.5532	1.5708

*At a power input of 1,000 ergs sec^{-1} cm^{-3} on the high consistency rotational viscometer.

*The Texas Co., Port Neches, Tex.
†University of Florida, Gainesville, Fla.

What Does "A.B.C." Mean to an Oil Man?

A.B.C. means Audit Bureau of Circulations, an organization started in 1914 and now including more than 370 business publications. A.B.C. hires independent auditors to check the circulation statements of each member publication and issues a detailed breakdown showing how many people have paid to get it, what their occupations are, and where they are located. There is no mystery about who gets The Oil and Gas Journal, or how.

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The Editors

the OIL AND GAS JOURNAL

MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

Alphabetical List of Some of the More Common Refinery Alloys and Steels

Part 2

by W. L. Nelson
Technical Editor

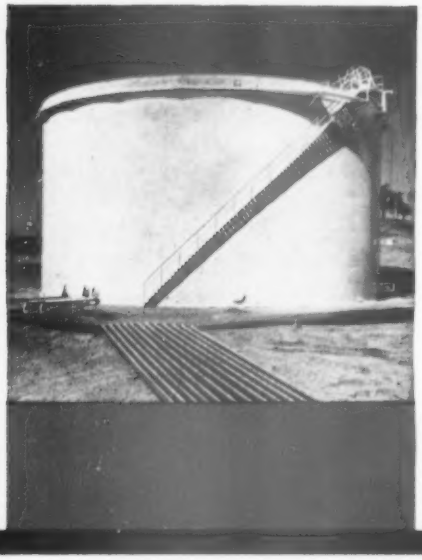
(A similar listing, alphabetized according to service or equipment will be published later)

Material—	Outstanding service	Chemical composition, per cent†							
		Fe	C	Cr	Ni	Mo	Mn	Cu	Si	Others
Cast-iron alloy	Brake drums		3.25	0.5				1.5	2.0	
	Brake drums		3.17					1.75	2.0	0.3 Va
	Brake drums, cylinder blocks		3.2		1.25	0.75	0.85		1.85	0.15 Va
	Centrifugal pump casing		3.2		1.6		0.65		1.4	
	Engine clutch plates, cylinder heads, and engine cylinder liners		3.1	0.4	1.5		0.65		2.1	
	Engine clutch plates		3.1	0.35					2.0	0.1 Va
	Condenser coils		3.4				0.55	0.9	1.7	
	Diesel crankshaft		2.6		1.15	1.1	0.95		2.5	
	Cylinder blocks		3.3					0.75	1.95	
	Diesel cylinder heads		3.0			0.5			2.1	0.1 Va
	Diesel cylinder heads, liners and pistons		3.2	0.6		1.0	0.8		2.0	
	Diesel cylinder heads and liners		3.6	0.4		0.9	0.85		1.6	
	Diesel cylinder heads and pistons		3.1		1.25	0.7	0.85		1.8	0.1 Va
	Cylinder liners and piston rings		3.1		1.0		0.8		1.0	
	Cylinder liners		3.2	0.5	1.75		0.55		2.0	
	Diesel cylinder liners		2.9			0.8	1.05		1.8	
	Cylinder liners		3.1		3.5	0.3	0.6		2.1	
	Cylinder liners		3.0		0.65	0.4	0.7			
	Exhaust manifolds		3.5	0.75	2.0		0.65		1.8	
	Fittings		3.4	0.3	0.2		0.55		1.5	
	Fly wheels		3.4				1.1	0.75	1.6	
	Diesel gears		3.2	0.4	1.75	0.6	0.7		1.6	
	Diesel pistons		3.4		1.0		0.65		2.5	
	Pump bodies		3.3	0.35				1.0	2.3	
	Tube supports to 900° F.		3.0	0.75					1.2	
	Tube supports to 1,000° F.		3.2	0.65	1.0-4.0				1.2-2.7	
	Corrosive services (Ni-Resist)		3.0	2.0	15.0		1.1	6.0	2.0	
	Scale resisting (Navy spec.)		2.8		12.0-15.0				1.2-2.2	
	Corrosion resisting (Duriron)	82.2	0.8				0.66		14.5	
	Corrosion resisting (Durichlor)	....				*3.0			*14.0	
Common brass	Exchanger baffle or turbulence plates							65.0		35.0 Zn
Copper-base alloys	(See brasses and alloy names)									
Cupro nickel	Severe water or "acid" corrosion				20.0-30.0			70.0-80.0		
Corrosion-resistant steels or alloys	(See steels or alloys by name)									
Durichlor	Corrosion by chlorides or acid					*3.0			*14.0	
Duriron (Corrosiron, Tantiron, etc.)	Sulfuric acid pans, pumps, valves, cocks, etc.		0.8-1.0				0.4		13.5-14.5	
Furnace tubes	(See steels, furnace)									
Furnace castings	(See steels, furnace)									
Hastelloy A	Extreme corrosion	22.0			53.0	22.0	2.0		1.0	
Hastelloy B	Severe "acid"-"sulfide" corrosion	6.0			60.0	32.0	1.0		1.0	
Hastelloy C (castings)	Severe "acid"-"sulfide" corrosion	6.0		17.0	51.0	19.0	1.0		1.0	5.0 W
Hastelloy D (castings)	Extreme corrosion				85.0		1.0	3.0	10.0	1.0 Al
Irons	(See cast irons)									
Illium G (castings)	Extreme corrosion	6.0		21.0	60.0	6.0	1.0	4.0	1.0	1.0 W
Illium R (wrought)	Extreme corrosion	6.0		21.0	60.0	5.0	1.0	3.0	1.0	1.0 W
Inconel (available as clad plate)	Most severe "acid"-"sulfide" corrosion	6.5		13.0	79.5			0.2		
Invar to 450° F.	Small coefficient of expansion, instrument parts, etc.	64.0			36.0					
to 650° F.		58.0			42.0					
to 1,000° F.		50.0-53.0			47.0-50.0					

*Minimum. †A blank does not necessarily mean zero or absent—it may mean that information is not available. The meanings of the symbols are Fe, iron; C, carbon; Cr, chromium; Ni, nickel; Mo, molybdenum; Mn, manganese; Cu, copper; Zn, zinc; Sn, tin; Al, aluminum; Mg, magnesium; W, tungsten; Si, silicon; Sb, antimony; Va, vanadium; Ti, titanium; Pb, lead; Ag, silver; and Cb, columbium.

the important factors in **floating roof design**

number 3 of a series

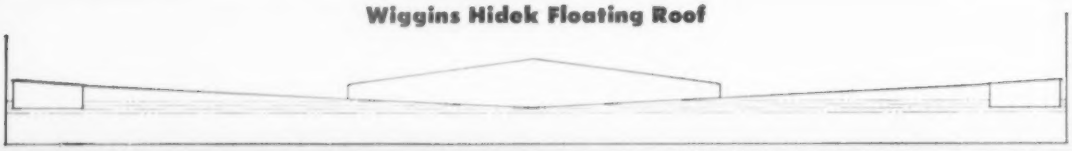


complete, clean drainage

The complete, clean drainage of Wiggins Floating Roofs assures year-round protection against paint peeling, rusting, and dangerous accumulation of water.

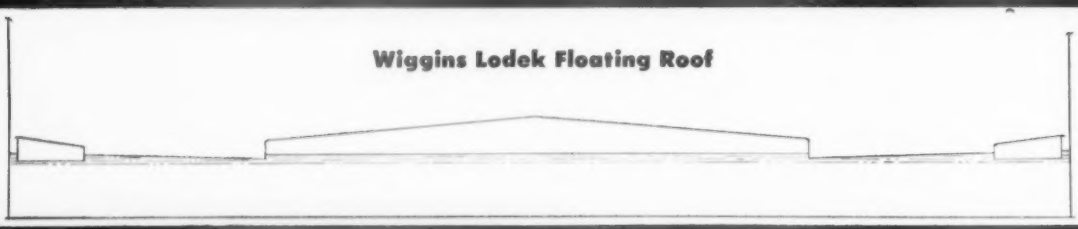
Wiggins Floating Roofs drain quickly—drain clean—because, they have the steepest pitch of all floating roofs. The patented Wiggins drains are designed to handle loads up to 6" per hour rainfall. Radial plates with radial welds prevent puddles from forming.

Wiggins Hidek Floating Roof



Only Wiggins floating roofs meet every important design specification

Wiggins Lodek Floating Roof



Other Vital Wiggins Conservation and Safety Features

Triple Seal Protection
- Exclusive primary, secondary and top seals provide the most effective protection against vapor loss.

Pontoons
- Divided into multiple *gas-tight* compartments for safety
- Deep and roomy, uncluttered with framework—for easy inspection, maintenance and repair

Strength
- Special Wiggins design gives optimum strength with the least amount of precious steel—better than normal safety factor

Capacity
- You get top-to-bottom use of tank capacity

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South LaSalle Street • Chicago 90, Illinois

Part 46 of a series

by Dr. B. E. Lauer, Head, Department of Chemical Engineering, University of Colorado

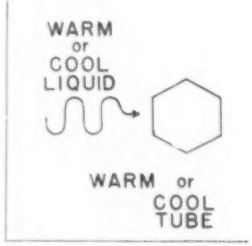
h_f HEAT TRANSFER

COEFFICIENT of HEAT TRANSFER through FILM between OUTSIDE SURFACE of a HEXAGONAL TUBE and a LIQUID

Liquid Movement: Turbulent

Direction of Movement: Normal to tube

Heat Movement: Heating or Cooling



EQUATION:

$$h_f = 0.0385 \frac{K}{D}\left[\frac{DV\rho}{\mu}\right]^{0.782}\left[\frac{C_p\mu}{K}\right]$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr.sq.ft.°F.

K - Thermal conductivity of liquid, BTU/hr. sq. ft. °F./ft.

D - Length of side, ft.

V - Velocity of liquid, ft./hr.

ρ - Density of liquid, lb./cu. ft.

μ - Absolute viscosity of liquid, lb./ft. hr.

C_p - Specific heat of liquid at constant pressure, BTU/lb. °F.

LIMITATIONS:

Applicable to flow rates giving Reynolds number $(DV\rho/\mu)$ of 19,500 to 100,000.

PHYSICAL CONSTANTS: The values of the physical constants such as density, viscosity and others are reported in the International Critical Tables, in several handbooks, and in the technical literature.

Page references in the Chemical Engineers' Handbook, J. H. Perry (1948) are as follows:

for ρ -- 130-148, 175-195, 1583.
μ -- 370-374, 1198, 1696.
K -- 459-461, 1303, 1697.
C -- 225-235, 297, 1586, 1696.

REFERENCES:

1. Introduction to the Transfer of Heat and Mass, E. R. G. Eckert, p. 144.

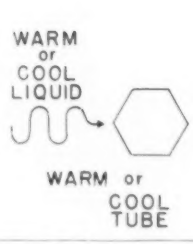
S 2,5 c (2) (a)

COEFFICIENT of HEAT TRANSFER through FILM between OUTSIDE SURFACE of a HEXAGONAL TUBE and a LIQUID

Liquid Movement: Turbulent

Direction of Movement: Normal to tube

Heat Movement: Heating or Cooling



EQUATION:

$$h_f = 0.153 \frac{K}{D}\left[\frac{DV\rho}{\mu}\right]^{0.638}\left[\frac{C_p\mu}{K}\right]$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr.sq.ft.°F.

K - Thermal conductivity of liquid, BTU/hr.sq.ft.°F./ft.

D - Length of side, ft.

V - Velocity of liquid, ft./hr.

ρ - Density of liquid, lb./cu. ft.

μ - Absolute viscosity of liquid, lb./ft. hr.

C_p - Specific heat of liquid at constant pressure, BTU/lb. °F.

LIMITATIONS:

Applicable to flow rates giving Reynolds number $(DV\rho/\mu)$ of 8,000 to 100,000.

PHYSICAL CONSTANTS: The values of the physical constants such as density, viscosity and others are reported in the International Critical Tables, in several handbooks, and in the technical literature.

Page references in the Chemical Engineers' Handbook, J. H. Perry (1948) are as follows:

for ρ -- 130-148, 175-195, 1583.
μ -- 370-374, 1198, 1696.
K -- 459-461, 1303, 1697.
C -- 225-235, 297, 1586, 1696.

REFERENCES:

1. Introduction to the Transfer of Heat and Mass, E. R. G. Eckert, p. 144.

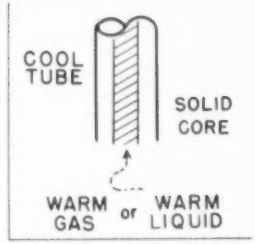
S 2,5 c (2) (b)

COEFFICIENT of HEAT TRANSFER through FILM between INSIDE of a COOL TUBE and WARM FLUID

Tube partially filled by solid core

Fluid Movement: Turbulent

Tube Position: Horizontal or vertical



EQUATION:

$$h_f = 0.023 \frac{K}{D_e}\left[\frac{D_e G}{\mu}\right]^{0.8}\left[\frac{C_p\mu}{K}\right]^{0.3}$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr.sq.ft.°F.

K - Thermal conductivity of fluid, BTU/hr.sq.ft.°F./ft.

D_e - $D_2 - D_1$.

D_2 - Diameter of inside of tube, ft.

D_1 - Diameter of core, ft.

G - Mass velocity through annular space, lb./sq.ft.hr.

μ - Viscosity of fluid, lb./ft.hr.

C_p - Specific heat of fluid at constant pressure, BTU/lb. °F.

LIMITATIONS:

Use of this equation is limited to gases and to liquids of viscosity not more than twice that of water.

PHYSICAL CONSTANTS:

The values of the physical constants such as density, viscosity and others are reported in the International Critical Tables, in several handbooks, and in the technical literature.

Page references in the Chemical Engineers' Handbook, J. H. Perry (1948) are as follows:

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K - 459-461, 1303, 1697.
C - 225-235, 297, 1586, 1696.

REFERENCES:

1. Heat Transmission, William H. McAdams, page 900.
2. Process Heat Transfer, D. Q. Kern, pp. 808.

T 1,9 c (2)

EQUIPMENT MEN . . . in the News

Stirling Heads Sales, Market Research for Dowell

M. L. STIRLING

Sales forecasting and market analyses for Dowell Incorporated will be handled by a newly organized department of sales and market research under M. L. Stirling, according to announcement by A. C. Polk, Jr., general manager of Dowell at Tulsa.

Stirling has been in the Dowell sales department for nearly 15 years. Prior to joining Dowell he spent more than 10 years in oil-industry sales activity. For the last 8 years he has been sales manager for Dowell.

Re Is Named Manager Of Netherlands United

John Re, formerly in charge of sales in the New York office of United Centrifugal Pumps, has been appointed manager of Netherlands United Centrifugal Pumps, with offices in The Hague, Holland. Netherlands United is a jointly owned subsidiary of United Centrifugal Pumps, a California corporation, and Atelier de Constructions Electriques de Charleroi, of Charleroi, Belgium, the latter being a licensee of United's with full manufacturing rights to its products.

Re in his new duties will have full responsibility for all sales, and will coordinate the sales and manufacturing facilities of both parent concerns. He has been an employe of United since 1929, where he started as a draftsman. He later became manager of the pump department, and since 1947 has concentrated his efforts on sales.

Cardinal Chemical Names Promotions, Transfers

Cardinal Chemical, Inc., Odessa, Tex., has announced transfers, promotions, and additions to its staff.

Mike Smith, with Cardinal as treating engineer at Levelland, Tex., since August 1952, is transferred to the Cardinal station at Hobbs, N. M., as manager. Eddie Freund, treating engineer, is transferred from the Odessa station to Hobbs. M. W. (Pat) Sharp has been added to the Hobbs staff as treating engineer.

Jim Ormond, Odessa station manager, is promoted to development engineer. Ormond originally joined the Cardinal staff in April 1952, and was promoted to station manager at Odessa in November 1952. G. W. Radney, with Cardinal since 1949, replaces Ormond as Odessa manager.

J. T. (Sonny) Mobley has been promoted to treating engineer, and Joe Overton has been added to the Odessa station in the same capacity.

White Motor Announces Modernization Program

Construction has started at Exton, Pa., on new manufacturing facilities for its recently-acquired Autocar Division, it has been announced by Robert F. Black, president of The White Motor Co., Cleveland. White's investment program in Exton, planned to replace Autocar's present plant at Ardmore, Pa., will total more than $2,000,000. The new construction is expected to be ready for occupancy early in 1954.

Black also announced that Edward F. Coogan, president of Autocar since

R. F. BLACK

E. F. COOGAN

1949, is to be named vice president in charge of the Autocar Division. C. R. C. Custer continues as treasurer; B. B. Bachman will continue as head of engineering and development, and A. Gelpke will continue in charge of production.

The new plant to be erected will provide 130,000 sq. ft. of new manufacturing facilities on one floor, of structural steel and masonry construction, with modern offices having 12,500 additional square feet of floor space, and water works with a 300,000-gal. reservoir.

Blaw-Knox Names Wingard To Sales Engineering Post

The Chemical Plants Division of Blaw-Knox Co. recently announced the appointment of M. R. Wingard as sales engineer. Wingard will be located at the western headquarters in Tulsa, and will offer the company's processes and engineering construction services to chemical, petrochemical, and industrial clients in a nine-state area.

Wingard, a chemical engineer, is a graduate of University of Akron and has done graduate work at University of Michigan.

Sargent Establishes 15 Mid-Continent Field Stores

Sargent Engineering Corp., manufacturers of oil-well pumps for more than 30 years, has established its own sales and service stores in 15 Mid-Continent producing areas, according to an announcement made by George L. Sargent, director of oil-well pump sales.

Sargent field stores are located in Odessa, Snyder, Houston, Sundown, Wichita Falls, and Winnsboro, Tex.; Oklahoma City, Pawhuska, and Seminole, Okla.; Hobbs, N. M.; Chase and Russell, Kans.; Grayville, Ill.; Magnolia, Ark.; and Rangely, Colo.

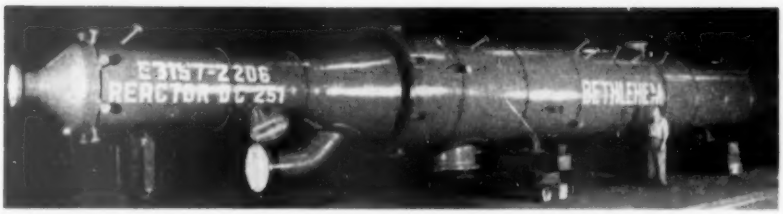
The same service facilities will be available that have been maintained in the Sargent field stores in Long Beach, Bakersfield, Santa Maria, Ventura, Taft, and Huntington Park, Calif.

Whitcomb Named Assistant Director of Advertising

William L. Whitcomb has been appointed assistant to the director of advertising of Glass Fibers, Inc., according to an announcement made by F. J. Solon, Jr., vice president and director of advertising and public relations of the firm.

In his new capacity, Whitcomb will supervise the merchandising material, inquiry, photographic and advertising budget sections. He will also assist in the preparation of general trade-paper advertising on the company's yarn, mat and wool products.

Bethlehem Ships Large Reactor Tower



A reactor tower, important member of the intricate equipment used in distillation and separation of crude oil into its constituents, ready for shipment from the Bethlehem, Pa., plant of Bethlehem Steel Co. Made of welded steel plates, the tower weighs 24 tons and is approximately 77 ft. long. Its inside diameter ranges from 7½ ft. at the large end to about 4 ft. at the small end.

Dresser Names Garrison To Sales Promotion

D. L. GARRISON

H. Z. Hight, sales manager for the Dresser Manufacturing Division, Dresser Industries, Inc., Bradford, Pa., has announced the appointment of Donald L. Garrison as sales - promotion representative on new gas pipe-line products and corrosion products, including Dressertape.

Garrison was formerly employed by Boston Consolidated Gas Co. as cadet engineer for 2 years and staff engineer for 1 year. He graduated from Norwich University in Vermont as a mechanical engineer.

Garrison will make his headquarters in the Dresser office at Bradford while representing Dresser Manufacturing Division.

Axelson Names Pugh Director of Advertising

W. W. Greenway, vice president of Pressed Steel Car Co., Inc., and general manager of Axelson Manufacturing Co. division, has announced the appointment of John H. Pugh as director of advertising and public relations for the Axelson division. Pugh is a graduate of Stanford University.

The 61-year-old Axelson division is one of the nation's leading producers of oil-well pumping equipment, engine lathes, and aircraft landing-gear components.

Puleo To Represent BS&B In St. Louis District

J. F. Myers, manager, safety head-vent valve sales, has announced that Peter A. Puleo will represent Black, Sivalls & Bryson, Inc., in the St. Louis district in its line of safety heads and vent-valve equipment.

Puleo spent 2 years in the St. Louis University school of business, and then graduated with a B.S. degree from the school of chemical engineering, Washington University. He established the Industrial Process Equipment Co. the first part of this year, and he has had experience as sales engineer with both Crane Co., and Fischer & Porter Co.

New Ethylene Plant to Have Electronics Controls

An extensive electrical temperature transmitting system will control critical processing phases at the world's largest ethylene plant being constructed at Tuscola, Ill., by Lummus Co., as recently announced.

To be designed and engineered by Minneapolis-Honeywell's industrial division, the system will incorporate a host of electronic instruments regulated through a central control panel. The system is believed to be the most complex ever designed for regulation of such cracking operations. The new ethylene plant, currently being constructed for National Petro-Chemicals Corp., is an $8,000,000 development. Its capacity is estimated at some 600,000 lb. daily.

Gulf States to Distribute Snap-Tite Products

Gulf States Distributing Co., Houston, of which Robert H. White is president, was recently named sales representative for Snap-Tite, Inc., Union City, Pa., manufacturers of the Snap-Tite Hi-Flow line of quick-change couplings.

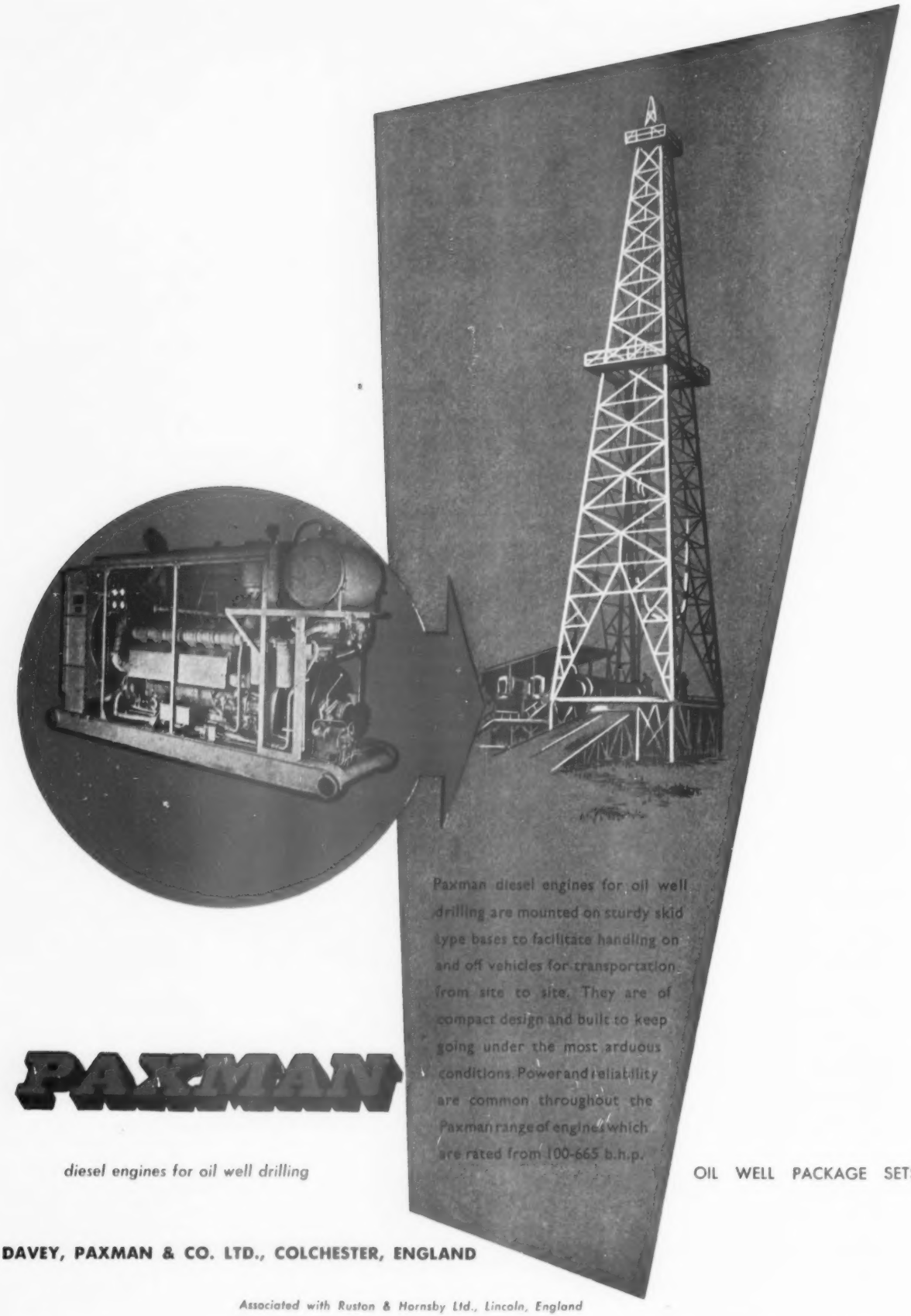
In October 1952, White, who has over 17 years' sales experience in related fields, organized and incorporated Gulf States, a sales organization. Gulf States has an exclusive franchise on Snap-Tite products for the southern part of Texas, and will solicit manufacturers and users in that area.

Mission Executives Complete Reading Clinic

Mission Manufacturing Co. executives and departments head who attended a recent reading clinic course sponsored by University of Houston, were: Richard E. White, works manager; Ed Boyle, chief inspector; Bass Hoyler, personnel director; Byrom Wehner, head experimental engineering section; Don Mackenzie, chief tool engineer; Bob Creasy, sales office administrator; John Sandberg, chief metallurgist; William A. Langdon, plant engineer; Neal Heaps, centrifugal pump assistant manager; H. Ben Young, chief engineer; Walter Liljestrand, head research and development, and W. N. Brown, head product-development engineer.

Executives and department heads of Mission Manufacturing Co. have recently completed a reading clinic sponsored by University of Houston. Mission is one of the first Houston industries to take advantage of the university course.

The reading clinics are designed to give key men in industry a chance to improve their reading habits in order to obtain a better grasp of various reports and catalogs used in their work. During the 3-month course, a university instructor meets with the group once or twice a week to work on reading problems. Through various tests



Paxman diesel engines for oil well drilling are mounted on sturdy skid type bases to facilitate handling on and off vehicles for transportation from site to site. They are of compact design and built to keep going under the most arduous conditions. Power and reliability are common throughout the Paxman range of engines which are rated from 100-665 b.h.p.

PAXMAN

diesel engines for oil well drilling

OIL WELL PACKAGE SETS

DAVEY, PAXMAN & CO. LTD., COLCHESTER, ENGLAND

Associated with Ruston & Hornsby Ltd., Lincoln, England

and measuring devices each individual is able to gage his own reading ability and correct any difficulties.

Edward Valves Transfers H. W. Bierman to Tulsa

Edward Valves, Inc., East Chicago, Ind., has announced appointment of H. W. Bierman as sales engineer for the territory comprising Oklahoma and parts of Missouri, Arkansas and Texas. Bierman, formerly located at the Edward home office, will make his headquarters at the Rockwell Manufacturing Co. offices in Tulsa.

Watson Is Named Sales Manager by Wm. Cameron

W. D. WATSON

Wm. Cameron & Co. has announced the appointment of W. D. (Boots) Watson as sales manager for the retail division of the company. He will direct the sales activities of the 30 oil-field yards operated by the company in Texas, Oklahoma, and New Mexico.

Watson will make his headquarters at the general offices of the company in Waco, Tex. He has been with the Cameron company for the past 25 years, and for the past 8 years he has been district manager in the oil-field division with headquarters in Overton, Tex.

W. D. Moore, formerly manager of the Cameron yard at Carthage, Mo., has succeeded Watson as district manager.

Rockwell Sales Engineers Complete Refresher Courses

Two Rockwell Manufacturing Co. sales engineers recently completed courses in natural-gas transmission and distribution at the Institute of Gas Technology, Chicago, in line with the company's expanding sales-education program.

The two are Harry J. Schneider, of the firm's New York district office, and Harry Moore, of the Columbus office.

This is the second year that Rockwell representatives have attended the

an ACCO product

AMERICAN CHAIN

Here's What Swampers Say—

HOUSTON: *"I've used AMERICAN Chain so long I can't remember. You sure don't have trouble with it."*

ODESSA: *"Give me AMERICAN Chain and show me what's to be moved."*

TULSA: *"Who says there's anything better than AMERICAN Chain?"*

These experienced material handlers are talking about two chains AMERICAN designed and made especially for oil field service:

WINCH LINE TAIL CHAINS

A strong, flexible tail chain for wire rope. Made of heat-treated high carbon steel. Specially designed drop forged, alloy steel hook won't damage rope. Four sizes for trucks, tractors, and all other winches.

BOOMER CHAINS

For holding loads and winching, hoisting, or towing. In 20-foot lengths with ACCO (I-beam type) Grab Hooks. Made from ACCO H.C. High Test chain or Endweldur 125 chain in four popular sizes.

AMERICAN makes chain for every oil field use. Stocks are carried in supply stores throughout the oil fields. Specify . . . and *get* AMERICAN Chain.

ACCO

TRADE MARK

AMERICAN CHAIN DIVISION
AMERICAN CHAIN & CABLE

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American Chain

THERE'S AN
INSLEY
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PROJECT

The Insley Manufacturing Corporation has been manufacturing construction equipment since 1907. The Insley Line includes excavators and cranes, 5 to 30 ton capacity—crawler or rubber mounted. There's an Insley working near you on a pipeline project.

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course. Aim of this program of additional education for the firm's sales engineers is to improve its ability to serve the gas industry, according to L. A. Dixon, executive vice president.

Bristol Co. Appoints Nuber Sales Manager

ERNEST NUBER

Ernest Nuber has been appointed sales manager, instrument division, of The Bristol Co., Waterbury, Conn., according to an announcement by H. E. Beane, vice president of sales.

Nuber joined the Bristol sales engineering organization in 1929. He was made Pacific Coast manager in 1934 and later served for several years as export manager. In 1948 he was promoted to the position of manager, application-engineering department. He will continue to maintain headquarters at the company's main office at Waterbury.

Lane-Wells Opens New Branch in Wyoming

Lane-Wells Co. has opened a new branch location at Newcastle, Wyo. Lynn W. Day has been named operator in charge of this new company branch.

Butler Names New Sales Head for Oil Equipment

R. C. HEARST

Rex C. Hearst has been appointed sales manager of the oil-equipment division of Butler Manufacturing Co., Kansas City, Mo., it was announced recently by G. A. Burns, vice president and oil equipment division manager.

Hearst was formerly sales manager of oil equipment for Butler's Richmond, Calif., plant. In 1948 Hearst joined Butler and shortly thereafter was sent to the Richmond plant as district sales manager of oil equipment. During the next 5 years he was promoted to regional sales manager of both the oil equipment division and the special products division.

Hearst will be succeeded in his California position by Asa A. Hammons.

For complete specifications write for Bulletin 50.

ACCURATE GAS PRESSURE

The RS Standard Dead Weight Gage facilitates testing gas pressures; rock pressure at wells; static pressure on orifice meters and pipe line pressure in locating leaks. The design of the gage is based on the principle of applying pressure by a known weight to a hydraulic piston of known area; and of the converse effect to measure unknown pressure by balancing its force on a piston of known area with a known weight.

THE INSTRUMENT IS CALIBRATED TO INDICATE PRESSURES WITH A PRECISION OF 0.1%.

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- NO HAZARD

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No. 2 Swivel for heavy duty pressure or vacuum service.

No. 17-ST Swivel for stationary installations such as service station delivery hose or similar applications.

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OUT OF THE VALLEY OF TEXAS:

A New Treasure For The Oil Industry

Magcobar has recently started producing the highest quality barite you can buy in this new plant at Brownsville, Texas . . . thus adding additional stocks of Magcobar Heavy Mud Weight to the oil industry's storehouse of high quality materials. Facilities at this deep water port insure prompt shipments to export markets and fast delivery to South Texas. These new Magcobar facilities are linked together in a chain with other Magcobar mining, manufacturing and service facilities that stretch from border-to-border, coast-to-coast. Wherever you operate, Magcobar's complete drilling mud service and ample stocks are available immediately. You can be sure of the quality . . . at fair and reasonable prices . . . when it's in the Magcobar bag.

Another Magcobar barite processing plant . . . Brownsville, Texas

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- CELL-O-SEAL
- FIBER SEAL
- MAGCO FIBER
- LEATHER-FLOC
- MAGCO MICA
- JEL-OIL MUD
- JEL-OIL "E"
- "E" CONCENTRATE
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Complete
DRILLING MUD SERVICE
DEALER

DIGEST OF NEW EQUIPMENT

IT'S NEW — CHECK IT

TRADE LITERATURE

1 WHERE PROFIT BEGINS IN PIPE-LINE PUMPING features Caterpillar diesel engines to fill all requirements in pipe-line pumping. These engines run on regular diesel fuel, crude oil, or natural gas. They can be used as permanent installations or for standby service. The folder emphasizes the operating economy provided by these engines as compared with other power units. It also contains a list of the various models with the respective ratings, both for 1-hour intermittent service or continuous 12 and 24-hour service. *Caterpillar Tractor Co.*

2 BULLETIN NO. 392. The Ideal Type T-12 Hoist, rated at 120 hp. for shallow drilling, servicing, and workover emphasizes construction of the hoist and features controls; includes performance charts, dimensional diagrams, specifications, and mobile mounting. *The National Supply Co.*

3 CLASS "CNTA" MULTI-STAGE CENTRIFUGAL PUMPS. A new 18-page, 3-color bulletin incorporates sectional drawings, installation views, and a 2-page chart showing the unusual amount of interchangeability of parts throughout the CNTA line. These units, specifically designed for boiler-feed, refinery, and process work are available for all pressures from 300 to 1,000 psi., with capacities to 700 g.p.m. *Ingersoll-Rand Co.*

4 NEW REFINERY PROCESS BURNER BULLETIN covers a line of Type MU combination gas and oil burners and Type C vertically or horizontally fired Premix gas burners for process furnaces. The new four-page folder, designated as Bulletin 703-A, describes in detail the construction features of both types of burners suitable for a wide range of fuels. Simplified design makes them easy to install and assures long trouble-free service. *Peabody Engineering Corp.*

5 FOAMGLAS, THE LONG-LIFE, ALL-TEMPERATURE INSULATION FOR TANKS AND OTHER EQUIPMENT, a new four-page folder, presents the physical properties of cellular glass insulation and lists the sizes and shapes available and recommended thicknesses required for temperatures ranging from —50° to 800° F. Condensed suggested specifications and photographs of applications make the folder an ideal reference for engineering and maintenance personnel. *Pittsburgh Corning Corp.*

6 DATA FOLDER ON TUBING AND PIPE FOR HIGH-TEMPERATURE SERVICE. Engineers in the oil-refining and field-processing industries who are associated with the design of equipment operating at elevated temperatures or pressures will be interested in this new data folder. The folder presents condensed technical data on 14 tubing steels used in high-temperature or high-pressure service. Data on analyses, mechanical and physical properties, creep strength, short-time elevated-temperature tensile properties, oxidation resistance, and other pertinent information are presented. *The Babcock & Wilcox Co.*

7 PIPE-REPAIR CLAMP. Details of the method by which pipe-line leaks of any kind can be permanently repaired in a matter of seconds, is covered in folder No. 201 which illustrates method of installation for both single and double repair clamps, and covers ordering specifications and prices. *Morris Coupling & Clamp Co.*

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OIL AND GAS EQUIPMENT Digest — NEW CHECK IT

8 THE THEW-LORAIN TL-10 TRUCK CRANE AT WORK is a picture book of on-the-job views of 6-ton Lorain TL-10 truck-crane installations. The Lorain TL-10 truck crane is the newest addition to the Lorain line. It retains all the turn-table features of the famous Lorain "TL" series such as "packaged" components, antifriction bearings, fast, and sensitive clutch action, but weighs less and has been otherwise modified to enable it to be used on commercial truck chassis. *The Thew Shovel Co.*

9 MEASUREMENT FACTORS OF A COMPANY AND ITS PRODUCT is the title of a new 4-color, 40-page institutional brochure. This handsome, plastic-bound booklet was designed and illustrated with more than 120 eye-catching photographs to tell the story of Onan products, what they are, and how they are manufactured. It tells pictorially what goes into the product. It is a story of people and planning, of tools and equipment. *D. W. Onan & Sons, Inc.*

10 GUARDING YOUR PROPERTIES AGAINST FLAME FAILURE EXPLOSIONS, Bulletin CP21, is a complete, nontechnical explanation of the explosion danger inherent in fuel-burning equipment, and the protection now available. Bulletin shows how to determine whether your fuel burner is adequately protected against explosion and briefly describes equipment now available which provides complete protection. *Combustion Control Corp.*

11 CONSTRUCTION OF CABLE-TOOL BIT FORGES, an eight-page pamphlet, contains diagramed, step-by-step instructions for building of efficient, field, tool bit forge from ordinary 55-gal. steel oil drum or other suitable container. Each step is covered complete with dimensions and all information requisite to proper mixing and burning of fuel used. *Spang & Co.*

12 CIRCULAR NO. 561, an informative and completely illustrated four-page circular, graphically describes complete line of all-iron and iron body, bronze mounted "King-clip" gate valves, available in inside and outside screw, yoke, and quick-opening patterns, flanged and screwed ends. Circular contains complete specification data and leading dimensions. *The Lunkenheimer Co.*

13 KAYLO HEAT INSULATION. The publication contains a listing of physical characteristics of Kaylo pipe insulation and Kaylo heat-insulating blocks; typical applications, K factors, standard sizes, thicknesses and forms, recommended thicknesses and insulation efficiencies. In 8 pages the publication includes 12 photographs, 3 graphs, and 5 charts. Kaylo products, made of a chemical compound of lime and silica, are effective up to 1,200° F. *Owens-Corning Fiberglas Corp.*

14 IT'S WISE TO ECONOMIZE is a four-page bulletin covering quality heat exchangers. Bulletin promotes repair department facilities—expert, trained personnel, large stock of materials, and prompt service. Retubing and rebuilding of pressure vessels, jacketed kettles, and agitated reactors are featured. *Manning & Lewis Engineering Co.*

15 A NEW G.S.I. SERVICE FOR YOUR MARINE EXPLORATION PROGRAM. G.S.I. offers the Sonic for unitized operation in conducting offshore seismic surveys. This folder describes the techniques, equipment, and methods for single-ship operation for offshore seismic surveys. *Geomarine Service International, S. A.*

16 NEW EXCEL-SO FEQ-5 COMBINATION WATER SEPARATOR, MICRONIC FILTER FOR DIESEL FUELS. Schematic drawings illustrate function and mounting instructions. In addition to descriptive material, a performance curve is included. Partial engineering details are listed. *Warner Lewis Co.*

17 POWELL STEEL AND SEMI-STEEL LUBRICATED PLUG VALVES Catalog PV-2 presents price lists, dimensions, engineers' drawings, sectional views, and pertinent data on a line of plug valves extending from 150 to 300 psi. Sizes range from ½ to 6 in. Valve accessories and component parts are also illustrated. *The Wm. Powell Co.*

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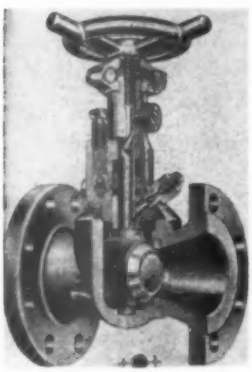
DIGEST OF NEW EQUIPMENT

IT'S NEW ✓ CHECK IT

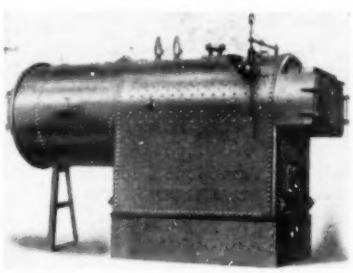
by Dan B. Miller

18 FORGED-STEEL VENTURI VALVE for L.P. gas service is designed so that there are no voids in the body to trap fluids. Vapor leaks are eliminated due to welding the forged-steel body and bonnet into one strong pressure vessel. In the A.S.A. class, Orbit venturi valves are available with flanged end only; carbon trim and stainless trim; and ring joint and raised face. All have maximum ratings of 250° F. They are available in 150 to 2,500-lb. class, in sizes from 1½ to 6-in. Outstanding among construction principles is the adjustable plastic stem packing. The stem packing chamber is backed up by a supply of auxiliary packing as extra protection against leakage along the stem. Valves can be repacked while under pressure in either closed or open position. The seating principle is friction-free in its operation. The seating core rotates to the open or closed position, but during the opening or closing cycle, the spherical seating surface of the core face never comes in contact with the valve body or the valve-body seat. *Orbit Valve Co.*



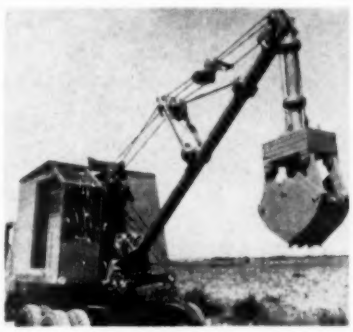
IT'S NEW ✓ CHECK IT

19 DOUBLE-PASS FIRE-BOX-TYPE BOILERS. For steam power service, this compact unit is available in sizes ranging from 36 to 153 hp. at 150 lb. w.p. Built to A. S. M. E. code standards the double-pass fire-box-type boiler is adaptable to be fired by oil, gas, or coal. It is ideal for winter heating requirements on rigs and applicable to any plant requiring steam up to 150 lb. or equivalent steam radiation for power or heating. *Lucey Boiler & Manufacturing Corp.*



IT'S NEW ✓ CHECK IT

20 NEW QUICK-WAY BUCKET involves a new principle of operation. The bucket is suspended from a specially designed frame of which the hammer drive is a part. The hammer lifts and drops with a pile-driver action. As the bucket stands open, jaws spread wide, the hammer impact travels through powerful coupling arms from the base of the hammer plate, straight to the teeth of the bucket, driving them into black top, shale, and other hard-to-penetrate surfaces. Starting from a straight-down bite, powerful clam jaws move in on the radius from both sides to further break up materials and pick up a full bucket load. Interchangeable hammer weights can be added or taken off to fit conditions. This attachment digs a vertically walled hole, rectangular in shape with even, regular sides, and the surface hole is only slightly larger than the spread of the open bucket. As a materials-handling bucket the attachment will pick up materials of all kinds. As a grapple the same bucket, without changes, picks up and loads rubble, pieces of cement, big rocks, pipe, logs, or scrap iron. *Quick Way Truck Shovel Co.*



IT'S NEW ✓ CHECK IT

21 CRESCENT ARMORED MULTITUBE offers a new way to make substantial savings on moderate to long runs of numbers of ½-in. and smaller tubes for use with instruments and process-control equipment. Armored multitube is an armored group of long-length tubes twisted together to permit bending without any distortion on the tubes, which are thoroughly protected from injury during and after installation by a flexible interlocked galvanized-

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This Digest of New Equipment offers you a quick resume of important features of new or improved products and trade literature and the opportunity to obtain complete information on each subject by use of the convenient "CHECK IT - MAIL IT" service card.

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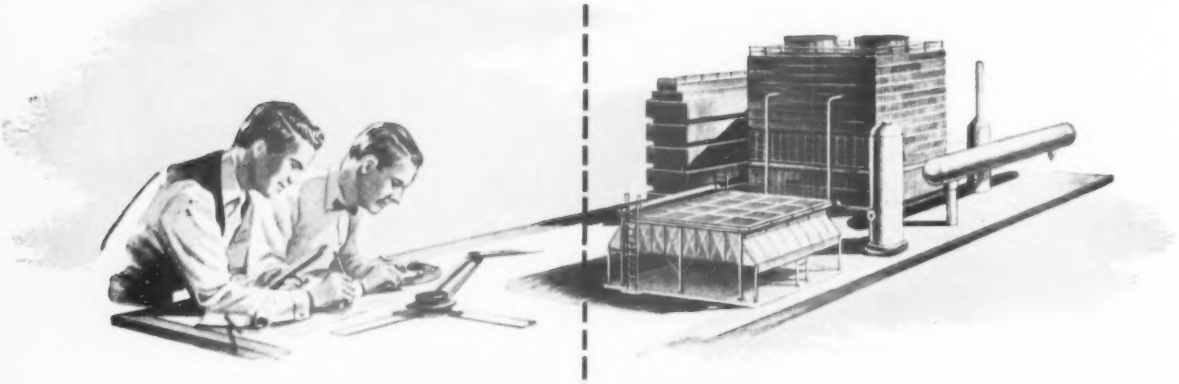

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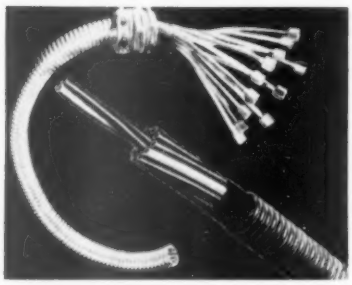
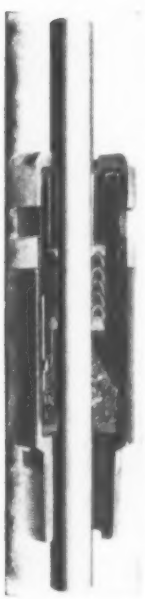
steel armor. One tube in each layer has a bright blue color, which permits a ready identification of each tube at both ends, so installers connect both ends without the necessity for tracing through each tube. The position of each tube in each layer, with respect to the color-coated tube in that layer, remains the same throughout any length of armored multitube. Two to 19 tubes in ¼-in. o.d. copper and aluminum are normally available from factory stocks. Long continuous lengths up to 1,000 ft. save waste and short ends. Tubes are available in copper, aluminum, polyethylene, and other plastics. *Crescent Insulated Wire & Cable Co.*



IT'S NEW CHECK IT

22 WETH-A-DRI, a new vinyl plastic coverall is made of specially processed film which will not crack in temperatures as low as —50° F. Ideal for industrial use, this garment is completely waterproof due to electronically welded seams. It is also windproof, flameproof, and resists mildew, peeling, and fading. Slash-through pockets make underclothing accessible, and zip front closure makes it easy to put on and remove. Complete size range includes small, medium, large, and extra large. A matching hat fits all head sizes. Coverall and hat stow compactly in a small plastic pouch. *Car-Blair, Ltd.*

IT'S NEW CHECK IT



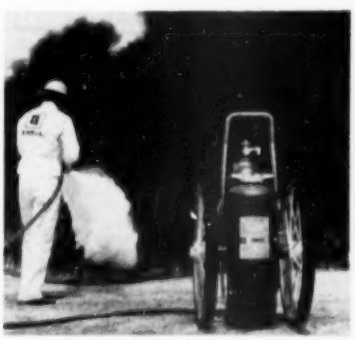
23 NEW DUAL-PAC STUFFING BOX makes it possible to replace the upper (fluid seal) packing without killing the well. The fluid seal packing used in the stuffing box has been proved in years of testing to have exceptional wear-resistant qualities. The packing is sealed on the polished rod by well fluid pressure. The higher the pressure the tighter the seal. The porous bronze gland used in the stuffing box is impregnated with oil. It eliminates contact with all other metal parts, accurately centers the polished rod, and reduces wear on the packing. The new stuffing box may be used with a wobbler, and is available for use on polished-rod liners. To replace the upper packing in the new stuffing box, it is only necessary to loosen the lock nut and screw down the retainer with the cap. This compresses the lower (Plasto-Pac) packing and forms a high-pressure seal that permits the upper packing to be removed without killing the well. The Plasto-Pac lubricates the polished rod in absence of well fluid. The Dual-Pac stuffing box is available in 2, 2½, and 3-in. sizes for 1⅛, 1¼, and 1½-in. polished rods, and for 1 5/16, 1⅜, and 1 7/16-in. o.d. polished-rod liners. *D+B Division, Emsco Manufacturing Co.*

IT'S NEW CHECK IT

24 SUCKER ROD "ON AND OFF" ATTACHMENT. This new tool assures quick and easy connection or disconnection of sucker rods at the pump. It provides for easy removal and replacement of sucker rods without disturbing the pump plunger. To operate, run the pump in on the tubing with the lower end of the Page tool in place. Then lower the rods with the matching ends of the tool attached. When the two sections of the attachment meet, turn right and lower to engage. Then a turn to the left will lock the two sections together. To disconnect, lower the rods, turn right to the radial stop and pick up. Both the spear and socket sections are milled with nine extra-heavy lugs to support the load and to assure long life. The photograph shows the spear section at bottom and the socket section at top. *Page Oil Tools, Inc.*

IT'S NEW CHECK IT

25 NEW FIRE EQUIPMENT: 150-B AND 350-B. New nozzle and gas-tube design and stepped-up rate of flow have increased the fire-fighting effectiveness of these welded extinguishers by 50 per cent. Incorporated in the special nozzle design is a new sealing principle (floating plug seated against a rubber pad) to insure water and gas tightness. Dry-chemical flow rate has been increased 30 per cent by redesigning the gas tube in the dry-chemical chamber, permitting efficient use of larger nozzle orifices. Range of the dry chemical stream is 40 ft. Operation and maintenance have been simplified by the addition of a check valve in the gas tube and a pressure gage in the nitrogen cylinder valve. Due to increased regulator capacity, operating pressure on the 350-B extinguisher can be reached in 12 seconds instead of 25 seconds. *Ansul Chemical Co.*



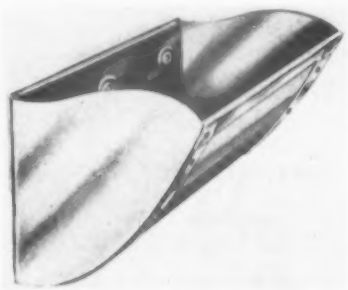
IT'S NEW CHECK IT

26 BIONETIC is a dry powder of preserved microorganisms together with their enzyme systems used in

the treatment of sanitary sewage and petroleum wastes. Bionetic is improving the operation of waste-treatment facilities. It is used by municipalities, leading industries, and utilities. Bionetic used in septic tanks reduces the amount of sludge by 60 to 70 per cent or more. It increases the settling of waste and reduces the carryover of solids into the tanks effluent. Regular use of Bionetic will keep organic solids in the septic tank at a minimum, and reduce cleaning costs. Over a period of several years it will only be necessary to clean accumulated sand and grit. Bionetic will eliminate odor nuisances where tanks are overloaded or operating poorly. It is harmless to humans and plumbing. *Reliance Chemicals Corp.*

IT'S NEW CHECK IT

27 **HI-CAP ELEVATOR BUCKETS** are suitable for handling any powdered or granular free-flowing material which is not excessively abrasive. They perform with equal efficiency at either high, medium, or low speeds and are suitable for either replacement purposes or new installations in chain or belt elevators. Buckets are made from heavy-gage cold-rolled steel. Durability and long life are assured by a rolled front lip of double thickness, so constructed as to be very rigid. The ends of the buckets are formed so as to support the body of the bucket. Ends and body are spot welded so as to remove all shear stress from the welds. *Fort Worth Steel & Machinery Co.*



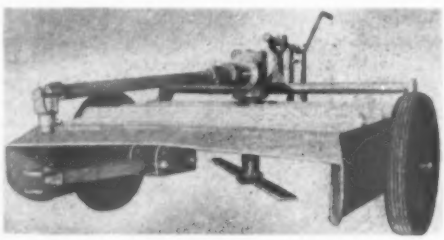
IT'S NEW CHECK IT

28 **WONDER BUILDING** is a new trussless steel structure. Entirely prefabicated, it is constructed of heavy 18-gage galvanized steel which has been put through a "Corro-Crimping" process to give the 10-ft. sheets shape and

rigidity. It comes in 20, 30, 40, 50, and 60-ft. widths with inside clearance of 9 ft. 6 in. to 20 ft. and in any length desired in even running feet. Factory bulkheads, with windows and doors to suit the purchaser are available. Ventilators and windows as desired bolt directly onto the top and sides. One size bolt and nut is used throughout. Lighting fixtures and insulating material may be fastened to sections. Erection is fast and simple. Foundation required is just a concrete slab with a shallow channel in which the ends of the arches set. After erection is completed, the channel is poured full of concrete, and the building is securely anchored. Five men easily erect 30 ft. of building in a day. The building is fireproof, will withstand a snow load of 70 lb. per sq. ft. and a wind velocity of 125 m.p.h. *M. P. H. Manufacturing Corp., Inc.*

IT'S NEW CHECK IT

29 **ROTARY BRUSH CUTTER.** Increasing use is being made of this type of machine for the maintenance of oil and gas pipe line right-of-ways. The machine,

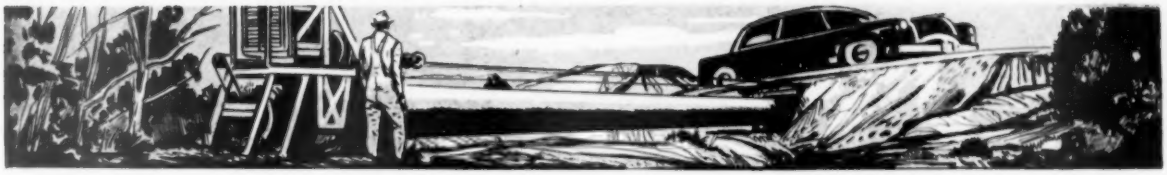


equipped with a 57-in. reversible spring-steel blade, will cut brush up to 2 in. thick in a single onceover. It is equipped with a heavy-duty gear box. Gears are heat-treated for hardness and run in a bath of oil. Roller and needle bearings, a standard universal joint and power take-off, and a shear pin to offset blade breakage are among the S-2's features. *E. L. Caldwell & Sons.*

IT'S NEW CHECK IT

30 **NEW ELLIOTT JIFFY GUN** shoots nylon brushes through condenser tubes for cleaning. The spiral design of the nylon brushes gives them a spinning, scouring motion which, together with the flushing action of the water from the gun, quickly removes sludge and other soft deposits from small tubes as in condensers and heat exchangers. The brushes have rubber bumpers or plugs at either end which are of a slightly smaller dimension than the tube to permit the water to pass and impart the spinning action to the closer-fitting brush. There is no danger of the brushes sticking in the tubes or injuring the tubes. The Jiffy Gun is operated by inserting the brush into the tube and then pressing the nozzle of the gun into the tube end. This releases the water pressure and insures a tight fit between the tapered nozzle and the tube. A shield behind the nozzle serves to divert any water which may temporarily back flow before the nozzle makes full contact with the tube end. *The Elliott Co.*

IT'S NEW CHECK IT



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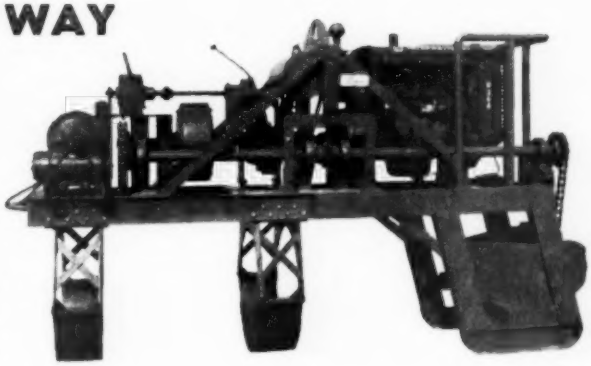

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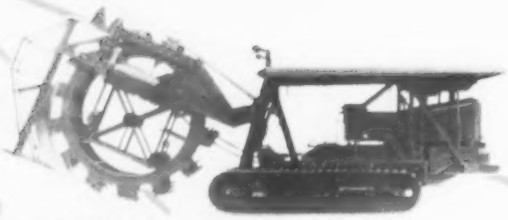
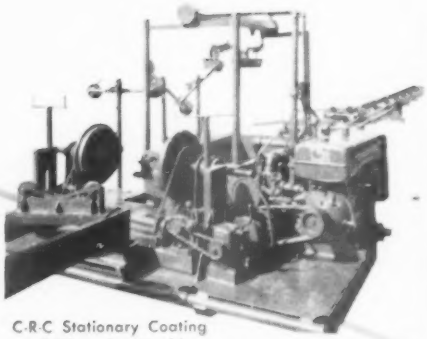
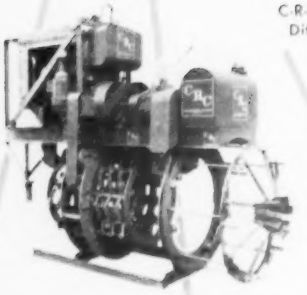
C-R-C Line-up for Pipe Line Progress



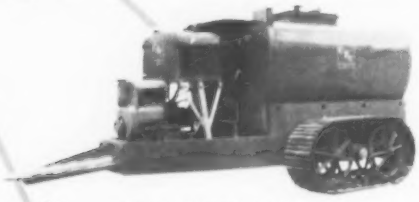
C-R-C Middle-incher Ditching Machine



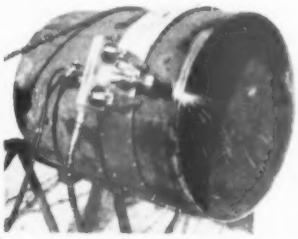
C-R-C Stationary Coating and Wrapping Machine



C-R-C Model "C" and Model "CR" Cleaning and Priming Machine

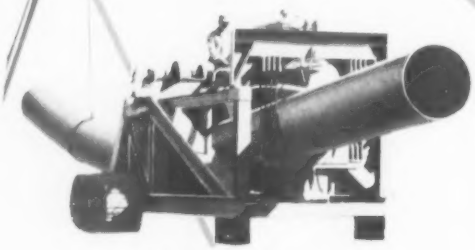


C-R-C 27-Barrel "S-P" (Sweep and Propeller agitation) Dope Kettle

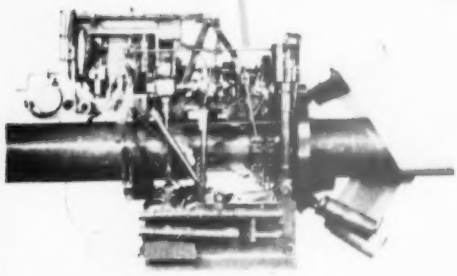


C-R-C Imco Pipe Beveler

C-R-C Lowering-in Belts



C-R-C Vertical Pipe Bender



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PIPE LINE

Ownership Decided

Sunray to own 50 per cent of 472-mile products line

TULSA.—Sunray Oil Corp. will hold 50 per cent interest in a 472-mile 10 and 12-in. pipe line which will transport about 35,000 bbl. daily of products from Oklahoma refineries to a Mississippi River terminus. Other owners include Eastman, Dillon & Co., New York investment bankers.

The new line, which was originally planned by Sunray, will extend from Duncan, Okla., through Central Arkansas to West Memphis, Ark. Between Duncan and Allen, Okla., the line will be 10-in. and will parallel an existing 8-in. products line which terminates at Drumright, Okla. At these three points, plus Bristow and Wynnewood, Okla., pumping facilities will be installed to receive products from refiners in these areas.

The remaining 375 miles of the line will consist of 12-in. pipe with storage and loading facilities located at Fort Smith, Conway, and West Memphis, Ark. At the latter point approximately 1,000,000 bbl. of storage will be erected for handling the various grades of products.

Officers named . . . Oklahoma-Mississippi River Products Line, Inc., a newly formed organization, will build and operate the proposed products system. President of the new company is J. L. Shakely, Tulsa, who retired recently as president of Jones & Laughlin Supply Co., and J. R. Ellis, former manager of Sunray's pipe-line department, is vice president and general manager.

Recently, Ford, Bacon & Davis, Inc., New York, completed preliminary engineering on the proposed system and has been securing the right-of-way. Presently, the firm is negotiating construction contracts. One contractor, Williams Brothers Co., has been engaged to lay the eastern 75 miles of the line. Other contracts are expected to be let this month with construction starting next month.

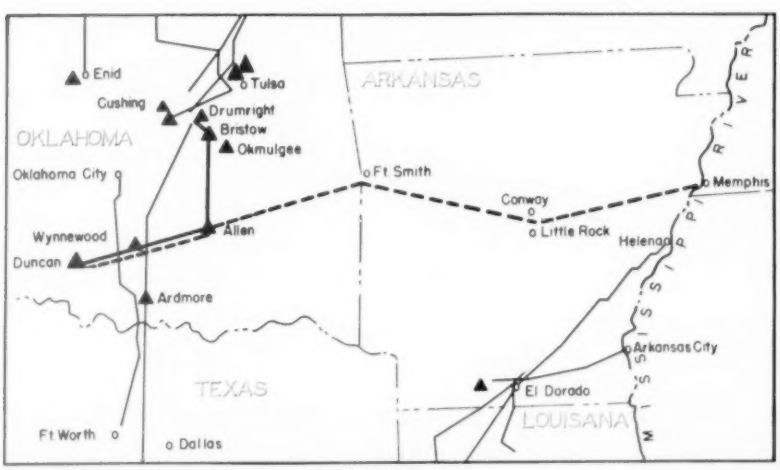
July 1 has been set as tentative completion date for the entire project, which will cost over $20,000,000.

Plans Changed

Northern Natural, El Paso, Permian revise big project

WASHINGTON. — Changes in the huge $100,000,000 pipe-line project which will supply midwestern markets with an estimated 300,000,000 cu. ft. of gas daily from West Texas and New Mexico fields have been proposed by El Paso Natural Gas Co., Permian Basin Pipe Line Co., and Northern Natural Gas Co.

The changes were set forth in two petitions to the Federal Power Commission. One petition, filed by El Paso, requests that part of its gas from the Spraberry Trend area be transported



ROUTE of the proposed 472-mile products line (dotted line) from Duncan, Okla., to West Memphis, Ark., is shown here. The heavy black line depicts Sunray Oil Corp.'s existing 84-mile, 8-in. products system from Duncan to Drumright, Okla. Other products lines in the general area are shown by light lines, refineries by bold triangles.

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by Permian, and proposed pipe-line facilities in that sector be redesigned and rearranged. The other petition, filed jointly by the three aforementioned companies, seeks changes in the previously authorized plans under which Permian is to deliver gas to Northern Natural through El Paso's lines.

New plans . . . El Paso's new request involves an expansion plan passed by the commission last spring in which the company is to raise the capacity of its pipe-line system by an estimated 400,000,000 cu. ft. daily. El Paso wants Permian to transport up to 225,000,000 cu. ft. of gas per day from the Spraberry area to El Paso's proposed Plains, Tex., compressor station to prevent the two companies from laying duplicate lines.

Also, El Paso requests that certain pipe-line facilities in the Spraberry area be changed to give greater flexibility in operations. The company estimates that the new proposal will save it an estimated $5,884,910 in pipe-line construction.

The joint petition relates to an earlier commission order in which Permian was authorized to deliver gas to El Paso at Plains, Tex., with the latter firm delivering an equal amount to Northern at Dumas, Tex., for the account of Permian. Under the proposed change, Permian would deliver the gas to Northern at Plains with Northern turning the gas over the El Paso there. Then El Paso would transport the gas for the account of Northern to Dumas where it would be turned back to Northern.

The present program calls for Permian to lay 163 miles of 14 to 30-in. lines from West Texas and New Mexico fields to a connection with El Paso in Yoakum County, Texas. From there the gas would go to Dumas where Northern would pick it up for transportation on a proposed transmission system terminating near Omaha. All construction is expected to be completed late next year *(The Oil and Gas Journal, May 11, page 163)*.

P. G. & E. Starts Construction Of 34-In. Gas Lines

SAN FRANCISCO.—Pacific Gas & Electric Co. has started construction on a $3,000,000 pipe-line project which will enable the company to receive additional gas supplies from El Paso Natural Gas Co.

The project, which is being handled by Engineers Limited Pipe Line Co., includes about 87 miles of 34-in. lines

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from Kettleman City to Arvin, Calif., and loop lines on P. G. & E.'s Texas to San Francisco 34-in. line.

The new lines will carry part of 400,000,000 cu. ft. of gas to be delivered to California by El Paso through a 771-mile, 30-in. transmission system, now under construction. The huge transmission system will terminate near Blythe, Calif. There P. G. & E., Southern California Gas Co., and Southern Counties Gas Co. will pick up the gas for delivery to their respective markets.

Nevada Gas Seeks to Change Size of Proposed Gas Line

WASHINGTON.—Nevada Natural Gas Pipe Line Co. is seeking Federal Power Commission permission to change the pipe size a second time of an authorized 114-mile gas line from Topock, Ariz., to a point near Las Vegas, Nev.

In June 1952 the commission granted the company permission to lay a 10¾-in. line to connect with El Paso Natural Gas Co.'s system at Topock. Last March the FPC amended the order at the company's request changing the pipe size to 12¾ in. to insure an adequate gas supply. However, company officials now desire to change the size of line back to 10¾ in.

In its new application, Nevada Gas asserts that the presently authorized line would cost an additional $250,000 which would outweigh any advantages in receiving the extra gas.

Morganfield Withdraws FPC Application for Gas Line

WASHINGTON.—Morganfield (Ky.) Natural Gas Co. has received Federal Power Commission permission to withdraw an application seeking authority to construct a 31-mile natural-gas line from Morganfield to a connection with Texas Gas Transmission Corp.'s system near Providence, Ky.

The company withdrew the application stating that financing for the $1,075,000 project could not be obtained.

Texas Gas Line Contract Let

BROWNWOOD, Tex. — Smith & Lingle Construction Co., Big Lake, Tex., has been awarded contract to lay a 20-mile, 6-in. natural-gas line from Wadley - Breeding field in Comanche County, Texas, to the municipal gas system here.

Presently the city of Brownwood, which let the $167,000 contract, is securing right-of-way for the line.

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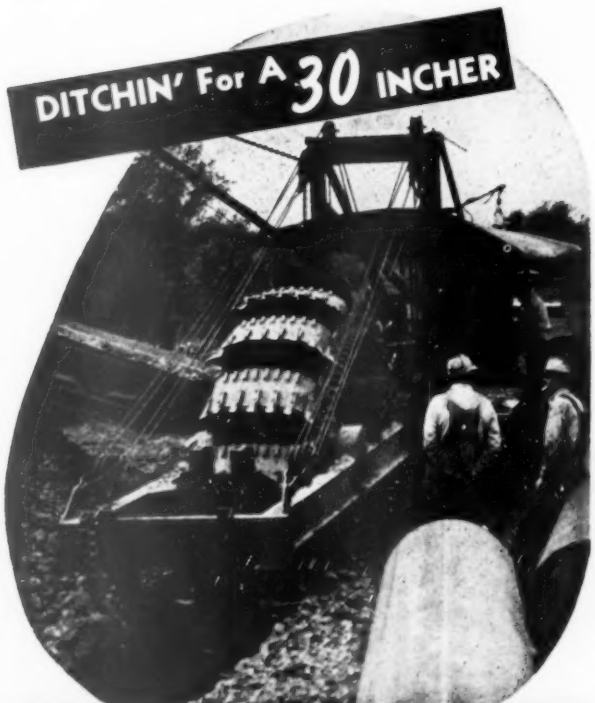

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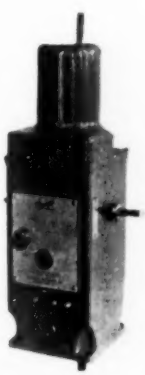

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REFINING

Tests Successful

New fuels, lubes combat engine deposit troubles

NEW YORK.—Three recent announcements indicate the trend to improved lubes and gasoline, to counter the effects of deposit formation and preignition, and to improve engine operation in other respects.

The Texas Co. removed the wraps on a new highly detergent heavy-duty motor oil called Advanced Custom-Made Havoline. Specially formulated to meet the severe lubrication demands of new high-power automobile engines, this lube will incorporate the company's own additives to improve the operation of hydraulic valve lifters and to reduce engine deposition due to lubricants. Texaco reports that disassembled engines, road tested at 1,000 miles per day for 22 days at 60 to 70 miles per hour showed clean combustion chamber surfaces with no deposition. The original tool marks of the manufacturers, they said, were clearly visible.

Gulf Oil Corp. also came out with a new lube product last week. The quick-starting, high viscosity index oil, named Gulfpride H.D. Light, is recommended for all types of service during cold and cool seasons, and wherever temperatures of 10° F. of below are encountered.

This oil meets SAE 5W, 10W, 20W and 20 classification requirements. It has replaced the regular 5W and 10W grades of Gulfpride H.D. According to Gulf, the high detergency quality of the oil minimizes sludge deposits, rusting, corrosion and combustion chamber deposit buildup. It can be used during warmer months, especially in new cars or cars in good mechanical condition where oil consumption with SAE 10W oils is not excessive.

New premium fuel . . . Cities Service Oil Co. has commenced marketing a new gasoline called "Cities Service 5-D extra premium motor fuel," along the East Coast from Maine to Virginia. They stress five new improvements in this grade. Research octane number has been increased one full number to meet the requirements of new high compression engines. The other four points, which involve additives are: an improved anti-oxidant lubricant for protection of upper cylinders, top rings, and valve stems a new antirust component, an additive to prevent carburetor icing, and a component which suppresses carbon deposition in the combustion chamber.

This last additive, on which the company did not reveal details has been given thorough laboratory and road tests. Reproducible results definitely demonstrated the ability to reduce engine deposition and thus lower the octane requirement buildup in new engines.

A.S.T.M. Approves New Commercial Avgas Grade

NEW YORK.—Committee D-2 on petroleum products and lubricants of the American Society for Testing Materials has given final approval to a fifth grade of commercial aviation gasoline. The new grade is known as 108-135, denoting its lean and rich octane ratings.

It will consist of approximately the same basic gasoline blends as the 115-145 grade, differing mainly in the content of tetraethyl lead, containing 3 ml. per gallon. In other specifications and inhibitor dosage, it will correspond roughly to the higher grade.

Grade 108-135 will appear in the new A.S.T.M. yearbook under designation A.S.T.M. D 910-53T. Not to be used by the military, it represents the first strictly commercial grade of avgas ever set up by the society. Color standard samples, minimum and maximum, will be made up for the society by Atlantic Refining Co. and will be available from A.S.T.M. headquarters, Philadelphia, at $1 per gallon.

Pan-Am to Install Third Fixed-Bed Hydroformer

EL DORADO, Ark.—Pan-Am Southern Corp. has contracted with The Lummus Co. for construction of a fixed-bed hydroforming unit at its 33,000-bbl. refinery.

In contrast with the fluid hydroformer recently completed at the company's Destrahan, La., refinery, this unit will conform in general to the original design of the war-time hydroformers. However, it will incorporate new design features, and will employ a catalyst developed at the Whiting Research Laboratories of the parent Standard Oil Co. (Ind.).

A similar unit with a rated capacity of 21,000 bbl. per day was recently announced for the Texas City, Tex., refinery of Pan American Refining Corp.,

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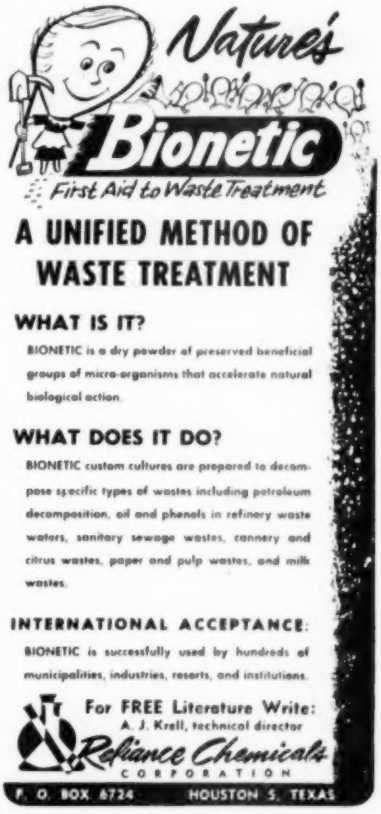
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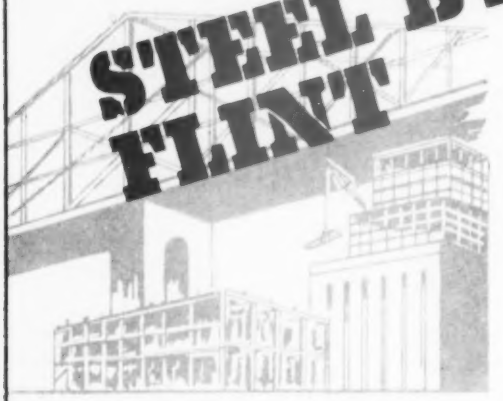

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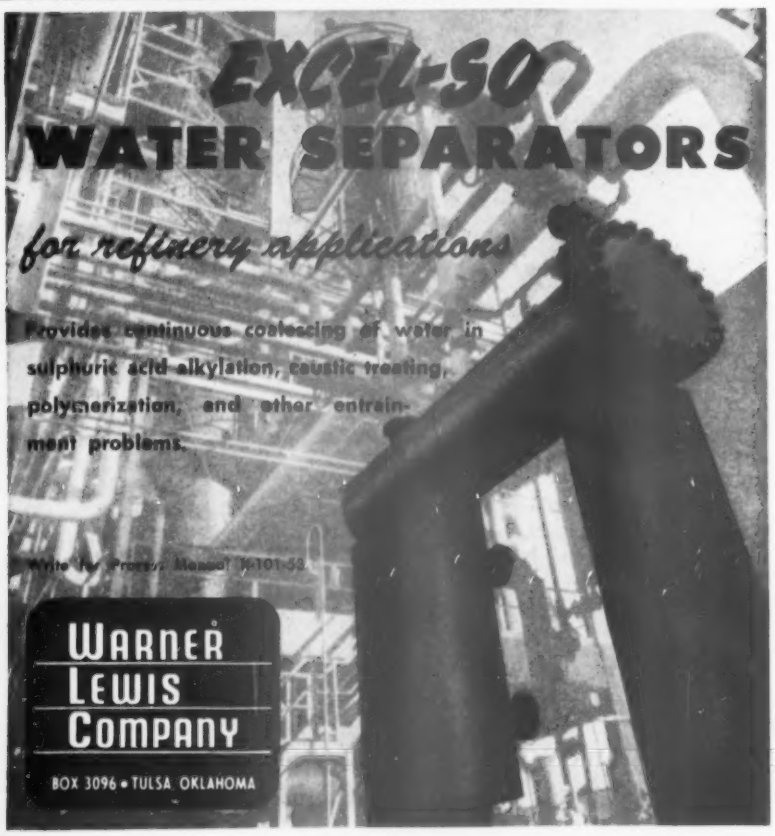
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to be built by the M. W. Kellogg Co. Standard of Indiana has a third unit under construction at Wood River, Ill.

Refining Briefs

EVERETT, Mass. — Esso Standard Oil Co. will dedicate its newly modernized and expanded refinery here October 14. New units include a 24,000-bbl. per day Model IV fluid catalytic cracking unit which will operate in close combination with crude distillation, thermal cracking and light ends recovery facilities. In addition, 13,100 bbl. daily vacuum distillation capacity has been added and thermal reforming and catalytic polymerization units expanded. The refinery has been expanded from 32,000 to 50,000 bbl. daily capacity.

MEMPHIS. — Delta Refining Co., wholly owned by Missouri Farmers Association, formally opened its newly expanded and modernized refinery here recently. On stream is a new air-lift Thermofor catalytic cracking unit with a rated capacity of 2,700 bbl. per day. The refinery has been expanded from 4,000 to 6,000 bbl. per day.

EL SEGUNDO, Calif. — Standard Oil Co. of California is now in production with a new p-xylene at its 127,000-bbl. per day refinery here. The separation unit charges selected aromatic fractions from the new 10,000-bbl. per day Platforming unit recently completed at El Segundo.

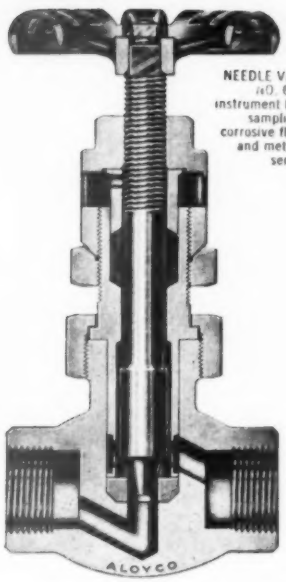
Petrochemicals

New Firm to Build Ammonia Plant Near Salt Lake City

SALT LAKE CITY. — Mill Creek Chemical Co. is being formed to build an anhydrous ammonia plant near here for conversion of natural gas to 180 tons of anhydrous ammonia per day, plus 30 tons of dry ice as byproduct.

Preliminary financing has been completed by Glore, Forgan & Co. of Chicago and New York. Contracts for design and construction have been let to Tears Engineers and Henry C. Beck of Dallas. Plant output will provide ammonia for synthesis of ammonium phosphate, ammonium sulfate and other nitrogen fertilizers, and some ammonia will be sold for direct soil application.

The new company will supply a 10-state area comprising a major fertilizer market which at present has no local source of nitrogen. Ammonia is presently being shipped into the Intermountain and Rocky Mountain sections from West Texas, California, and British Columbia.



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Teflon packing is available in all ALOYCO valves. Teflon renewable seats are available in small valves such as that illustrated and also in larger size globe, angle, Y, and check valves. Address your specific corrosion problems to the *Aloyco Corrosion Engineering Service*. Our long and specialized experience in this field is at your service.

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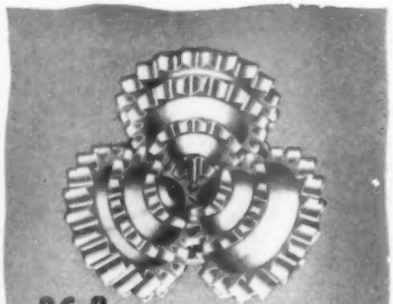

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Drilling Contractors

California Contractor Puts New Rig to Work

Hagestad Drilling Co., Bakersfield, Calif., has a new rig in operation on a 5,500-ft. wildcat test it is drilling for Fischgrund & Shane west of the Crown pool, near Edison, in Kern County, California. The rig is the third the company now is running in Kern County. It has an Emsco 350 draw works, powered by two 220-hp. Murphy diesel engines; a D-300 pump, powered by two additional engines of the same type and size; and a 96-ft. Bender mast. One of the company's other two rigs is under contract to Standard Oil Co. of California at Elk Hills, and the other to A. L. West at Northwest Belgian anticline.

Brown Drilling Co., Long Beach, Calif., is running the first soundproof rig ever used in the San Joaquin Valley area of California. The rig is on a well being drilled for The Texas Co. in the residential section of Arvin, in Kern County. It is similar to soundproof rigs used for several years for drilling in residential areas in southern California fields.

A. W. Williams Inspection Co., Mobile, Ala., contracting for E. B. LaRue, independent operator, Athens, Tex., is drilling a test on Colonel's Island, 3 miles south of Brunswick, Glynn County, in the southeastern coastal area of Georgia. The test, designated as 1 Massey, is scheduled to go to 5,500 ft.

R. H. Norris is contractor on a Knox dolomite test which Huntington Minerals, Inc., is starting in southeastern Prentiss County, northeastern Mississippi. The test, 1 Taylor, is a rank wildcat, being more than 40 miles north of previous development areas in the Black Warrior basin. Location is in 28-6s-9e, northeast of Marietta.

Miller & York, Bakersfield, Calif., will drill for Patrick A. Doheny at 1 Noble, a projected wildcat test located 2 miles northwest of Raisin City, in Fresno County, California. Location is in 5-15s-17e. The rig will come from a well the contractors now are com-

Crewmen on Stanolind Oil & Gas Co.'s Rig 25, operating in the Hackberry area of Cameron Parish, Coastal Louisiana, hear C. W. Frankland (standing), tool pusher, read the notification that they had won American Petroleum Institute's "Accident Prevention Award" in recognition of having worked 489,287 hours without a disabling injury. The Institute's citation covered the period from October 19, 1945, through December 31, 1952. As of August 1, this year, the crew had worked 28,427 more hours without a lost-time accident, raising the total to 517,724 hours. Crewmen in the picture are, left to right: Ray Duhon, L. R. Biana, J. L. Riley, G. H. Camp, Edgar Johnson, and W. B. Cox. Others, not shown, are T. W. Bonsall, R. W. Cohen, J. T. Johnson, K. P. Parker, Ludran Cormier, G. H. Camp, Dedica Desormeaux, Dupree Hebert, Carl P. Johnson, Jasper Little, Napoleon Kibodeaux, Floyd P. Little, Jack Waldron, M. H. Winters, Arthur Seay, Sherold E. Martin, and Nathaniel Woods.

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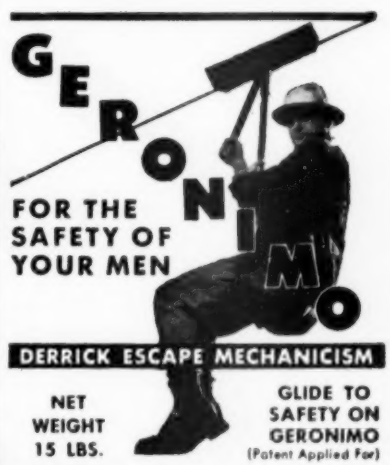

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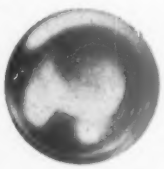

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pleting for Carlton Beal & Associates in the Devil's Den area, in Kern County.

L. B. Jackson, Tulsa, has contracted with Western Natural Gas Co., of Houston, for a rank wildcat test to be drilled in northwestern Jones County, West Central Arkansas. Location, 1 Gray, in 25-8n-24w, is a mile southeast of Prairieville, northwest of Booneville. Hole is projected to 6,500 ft.

Newton Drilling Co., Coalinga, Calif., is contractor on another exploratory test Tide Water Associated Oil Co. is starting in the Farnsworth area, northwest of the Lost Hills field, 45 miles northwest of Bakersfield, in Kern County, California. The new test is 22-8 S.F.&F.L., in 8-25-20.

Dunlap & Graham, Inc., Long Beach, Calif., is drilling a deeper exploratory test for Standard Oil Co. of California in the shallow-producing Dudley Ridge area of Kings County, California. The test, 33-1 S.P., in 13-23-19, is projected to the San Joaquin gas sand.

Southern Six Drilling Co. is moving in for a projected 12,000-ft. wildcat test to be drilled for Tide Water Associated Oil Co. at 1 Comeaux, in 83-8s-2e, 1½ miles east of Sunray Oil Corp.'s Northwest Branch gas-condensate field, in Acadia Parish, Coastal Louisiana.

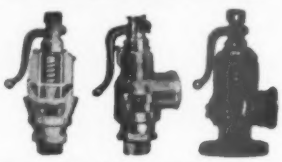
Rhodes Drilling Co. is moving a rig to a wildcat location northwest of the Caesar field, in Bee County, South Texas, where it will drill a projected 4,000-ft. test for itself and W. M. Averill, Jr., at 1 Miller, in the Franklin Lewis Survey. The rig has just completed a 4,930-ft. hole in Live Oak County.

ACTIVE ROTARY RIGS*

Area—	Week ended 10-5-53	Change week ended 9-28-53	Change week ended 10-6-52
Gulf Coast	566	+26	+ 32
N. & W. Tex.-N. M.	816	+30	+ 75
Ark.-N. La.-E. Tex.	182	− 4	+ 42
Oklahoma	357	− 1	+ 56
Kans.-S. Neb.	165	+ 4	− 9
Illinois-Eastern	153	− 3	+ 8
Rocky Mountains	276	+ 4	+ 21
Pacific Coast	164	−12	− 2
Total U. S.	2,679	+44	+223
Western Canada	176	− 6	− 22
Total	2,855	+38	+201

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States, and Pacific Coast and Illinois-Eastern areas are shown on pages 217 and 218.

INFERNO



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NATURAL GAS

P. G & E. Raising Capacity of Modesto Storage Project

MODESTO, Calif. — Pacific Gas & Electric Co. has begun increasing the capacity of its natural-gas underground-storage project here which will give the Modesto-Turlock area 50 per cent more gas this winter.

The company is adding 1½ miles of pipe to its buried storage-pipe system which consists of 3½ miles of 1,025-ft., 34-in. sections of pipe under an 8-acre tract. The expansion will raise the project's capacity from 3,000,000 to 4,500,000 cu. ft. of gas.

The additional supply will come from an extra 150,000,000 cu. ft. of gas daily Pacific will receive from Texas and New Mexico fields early next year. When a giant expansion program now under way is completed, Pacific will eventually get 700,000,000 cu. ft. of gas per day from these fields instead of its present 400,000,000 cu. ft. daily.

Carbon Black Output Up 2.7 Per Cent First 8 Months

WASHINGTON.—Total production of carbon black averaged 4,570,000 lb. daily for the first 8 months of this year for an increase of 2.7 per cent over the same period in 1952, according to the monthly report of the Bureau of Mines.

In line with the trend for recent years, furnace blacks accounted for all of the increase. Furnace-black production averaged 3,278,000 lb. for an increase of 15.4 per cent in contrast with a decrease of 19.9 per cent in production of contact black.

High-abrasion furnace production alone exceeded total contact production for the January-August period, averaging 1,332,000 lb. daily for an increase of 40 per cent over the same period last year.

Gas Turbines Save Money, El Paso Official Asserts

HOUSTON. — Gas turbine-driven centrifugal compressors cost less to operate than conventional compressors, according to S. R. Sawyer, El Paso Natural Gas Co.

Sawyer, addressing the annual meeting here recently of the American Society of Mechanical Engineers, stated that El Paso has been operating 16 gas turbine stations at operating costs of $10 per horsepower year as compared with $22 for others. He added that the gas turbine stations with further improvements, may be built at $50 less than other stations. The turbines are located on El Paso's parallel 737-mile 26 and 30-in. California transmission lines.

In giving examples on how the turbines saved money, Sawyer pointed out that some of these stations need only one-third of the personnel required for operating other types of stations. In another example, he said that when El Paso nearly doubled the capacity of the California system the 16 boosters were erected between six reciprocal stations located 100 miles apart. He noted that all of the gas-turbine booster stations required 50 per cent less steel than two reciprocal stations.

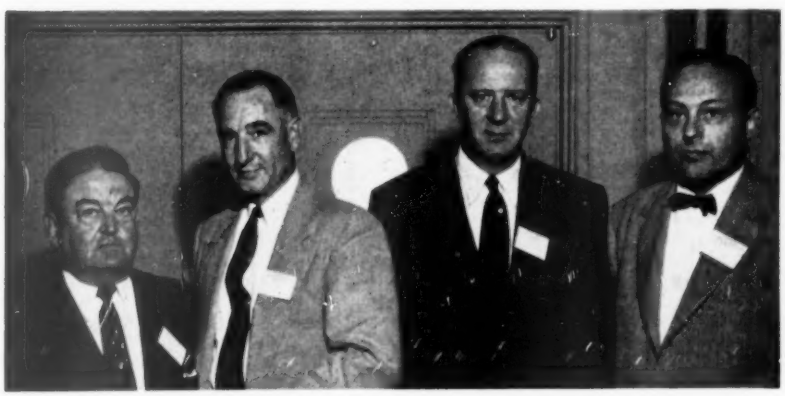
Sawyer observed that future expansion of large gas lines will open a greater field for gas turbines.

FPC Rejects Trans-Canada's Plea for Export Rehearing

WASHINGTON.—The Federal Power Commission here has denied an application by Trans-Canada Pipe Lines, Ltd., for rehearing of the FPC order granting Tennessee Gas Transmission Co. and Niagara Gas Transmission Ltd., permission to export natural gas to Canada.

In addition, the commission rejected a move by Trans-Canada to argue orally the application for a rehearing. The commission opinioned that the Canadian firm, which intervened in the Tennessee-Niagara proceeding, had raised substantially the same issues in an earlier brief and oral argument at the export hearing. Trans-Canada plans to export Alberta gas to eastern Canada.

The FPC authorization issued to Tennessee Gas September 1 allows the company to deliver an average of 62,000,000 cu. ft. of gas daily to Niagara at Niagara Falls, N. Y. Then the latter company would transport the gas to Consumers Gas Co. for distribution in the Toronto, Ont., area *(The Oil and Gas Journal, September 7, page 65)*.



I.N.G.A.A. Reelects Officers

The Independent Natural Gas Association of America reelected its officers for another 12-month term at the association's annual meeting in Houston recently. The officers are (left to right) S. B. Irelan, president of Cities Service Oil Co., Bartlesville, Okla., second vice president; J. J. Hedrick, president, Natural Gas Pipe Line Co. of America, Chicago, third vice president; C. P. Rather, president, Southern Natural Gas Co., Birmingham, president; and J. F. Merriam, president, Northern Natural Gas Co., Omaha, first vice president. Not shown are F. W. Peters of Tulsa, Oklahoma Natural Gas Co., treasurer, and John A. Ferguson, executive director.

Natural Gasoline

Survey Shows Bus Lines To Add 550 L.P.G. Vehicles

CHICAGO.—An estimated 29 privately and municipally owned bus lines operating L.P.G.-driven buses plan to add to their fleets this year 550 vehicles powered by the fuel, according to a recent survey conducted by the Liquefied Petroleum Gas Association, Inc.

The additional units will represent a 38 per cent increase over the 1,434 L.P.G.-powered buses in operation at the end of 1952. These buses are reported to have traveled a total of 55,785,205 miles last year requiring an average of 1 gal. of oil per 1,000 miles. The average oil change was required after 11,947 miles.

Steadfast in purpose

SPANNING America coast to coast with rails was impossible. That opinion was shared by almost all experienced engineers of the 1860's . . . but Major General Grenville Dodge remained steadfast in his determination that the Union Pacific would join the Central Pacific at Promontory Point as planned. With Dodge in charge, the impossible was accomplished and the golden spike connecting East with West was driven on May 1, 1869.

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EXPLORATION

"Fracking"—a New Exploratory Tool

by Philip C. Ingalls

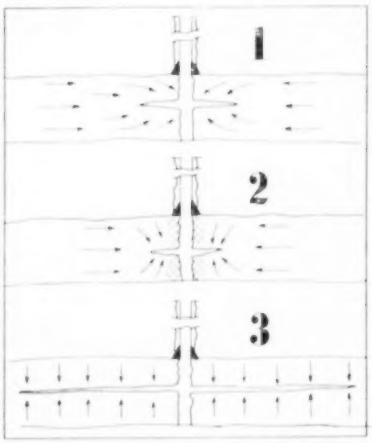
THE use of hydraulic fracturing to stimulate the productivity of oil and gas wells completed in formations of low permeability has proved so successful that the process is affecting exploratory thinking.

Sands and limestones known to contain gas or live oil in place but which exhibit permeabilities too low (0.1 to 5 md.) for satisfactory producing rates and efficient recoveries by shooting or acidizing, have been made profitable objectives by "fracking."

At the American Association of Petroleum Geologists' regional meeting in Wichita, George Roberts, Jr., manager of Stanolind Oil & Gas Co.'s research department, Tulsa, presented that thought in these words: ". . . formation fracturing can be planned to overcome various types of unfavorable conditions. It is indicated that many oil-bearing strata previously considered to have inadequate permeability for commercial production might now be made commercial by creating deep penetrating fractures. Geologists should therefore become familiar with these possibilities in order to better plan exploration programs."

Stanolind research engineers have made calculations of recoveries for several hypothetical reservoirs with low permeability. These calculations, verified by field results, indicate that substantial recovery may be obtained from extremely low permeability formations provided a deep fracture is created—the longer the fracture the higher the ultimate recovery. For one set of conditions it was found that without fracturing there would be no production, but with a small capacity (30-md.-ft.) fracture extending radially from the well bore to radii of 75, 225, and 615 ft. recoveries would be 9, 16, and 19 per cent, respectively. Recoveries of the same order of magnitude were indicated by calculations of other sets of conditions.

Roberts gave three reasons for the success of fracturing low permeability rocks (see sketch): (1) The diameter of the well is increased. A 300-ft. fracture in a 30-ft. formation exposes 12,000 times more rock than a 6-in. diameter well bore; but, in general, the percentage production increases due to this area enlargement are relatively small. (2) Zones of reduced permeability resulting from drilling and completion techniques are breached to provide a low-resistance path for formation fluids into the well. Most of the spectacular results from fracturing are due to this mechanism. (3) The increasing distances that fluid must creep through low-permeability rock to reach the well bore are shortened. Large increases in productivity for uniform but very tight formations can be credited to this result of fracturing.



Reasons for hydraulic fracturing success. (1) Exposes larger areas. (2) Bypasses zones of reduced permeability. (3) Alters flow pattern.

Initial fracturing work was performed using only 20 bbl. of treating fluid carrying about 400 lb. of sand. Today the technique has advanced to 2,400 bbl. of fluid containing more than 50 tons of propping agent. To answer the question of the relation of the volume of fluid to the length of the fracture radius in tight formations, Roberts gave the following estimates based on 1 lb. of sand per gallon of fluid: 100 ft., 10 to 25 bbl.; 200 ft., 50 to 100 bbl.; 400 ft., 250 to 500 bbl.; and 600 ft., 1,000 to 2,000 bbl.

Today, fracturing operations, which were put on a commercial basis in 1949, are being performed at the rate of nearly 2,000 per month. They are found to be successful in increasing production rates and estimated ultimate recoveries in more than 75 per cent of the wells treated.

Measured in barrels of oil, formation fracturing is comparable to the opening of a large sedimentary basin to production. And, in some of the old shallow producing areas, especially where water is not a problem, it is causing as much excitement.

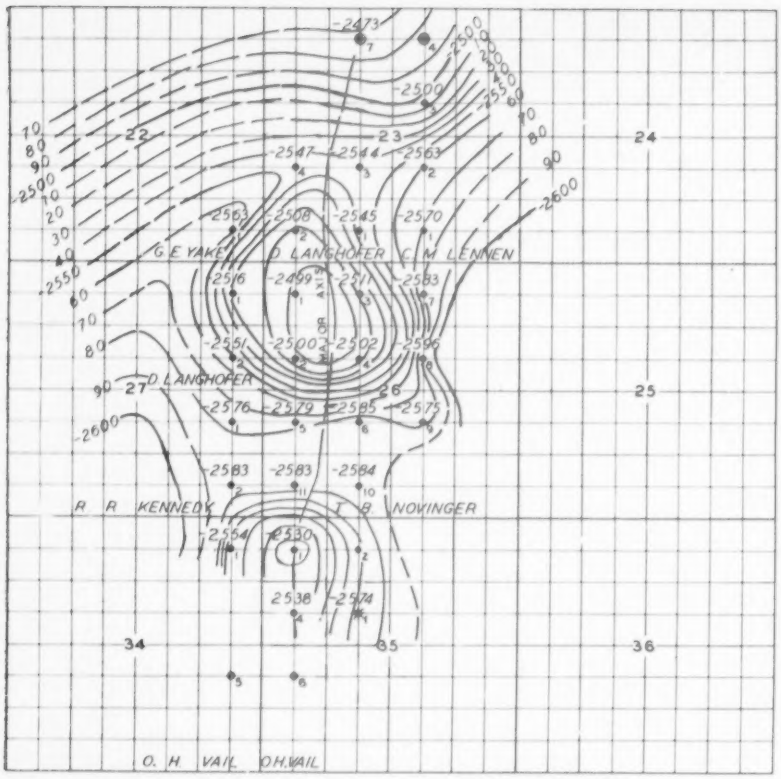
HIGHLIGHTS OF WEEK'S DEVELOPMENTS

NORTH DAKOTA . . . Amerada Petroleum Corp. completed 1 May, C NW NE 9-139n-100w, Fryburg area upper Madison discovery in Billings County. The discovery was finaled for 217 bbl. of 40.6°-gravity oil per day through 18/64-in. choke from open hole at 9,408-29 ft. Amerada recovered 4 bbl. of high gravity Ordovician oil at 2 Kvam, C SW NE 19-156n-95w, deep Beaver Lodge pool test.

WYOMING . . . Sohio Petroleum Co. completed 1 Unit, SE NW SE 36-32n-95w, Fremont County Tensleep discovery, for a swab gage of 407 bbl. of 22.2°-gravity oil per day. Gulf Oil Corp. has an indicated Mesaverde gas strike at 1 Rhodes, C NW NW 3-3n-2e (WRM), in the Wind River basin.

OKLAHOMA . . . K. A. Ellison et al. are drilling ahead at 10,656 ft. at 1 Community Featherstone, McClain County wildcat in the C NW SE 35-8n-4w. Bromide pay was assured on a drill-stem test at 10,535-90 ft.

WEST CENTRAL TEXAS . . . A third Cambrian well was in the making at White Flat pool in northeast Nolan County. Honolulu Oil Corp. 1 Whittaker at last report had tested 62 ft. of pay section and had flowed oil up to 110 bbl. hourly.



TOP OF MARMATON structure of Novinger field shows 50 ft. of structural closure in Lower Pennsylvanian bioherms. Area shown lies in 33s-30w, Meade County, Kansas (Fig. 2).

HUGOTON EMBAYMENT

Novinger Field Drilling Paces Search for Marmaton Bioherms

by Joseph A. Kornfeld

SIX drilling rigs active within a 3-mile radius of Novinger field, Meade County, Kansas, pace the search for Marmaton reef bioherms in the Hugoton embayment.

Less than 3 years after field discovery in November 1950, Novinger field has 27 oil wells producing nearly 34,000 bbl. of oil per month. Marmaton limestone reservoir is proved for a distance of more than 2 miles in a north-south direction and proved developed acreage exceeds 1,080 attributable acres in the east half of Township 33s-30w.

The field has been developed uniformly on a spacing density of 40 acres per well. Columbian Fuel Corp. is operator of the field and United Carbon Co. has a one-half interest in the operation. Depth to Marmaton reservoir averages 5,250 ft.

Proration schedule of the Kansas Corporation Commission lists six oil wells in the 2,250 to 2,500-bbl. potential class with a combined productivity of 34,120 bbl. per day. In addition, there are 21 wells in the minimum well classification with a combined productivity of 32,139 bbl. per day.

Novinger field was discovered in November 1950 by Columbian Fuel et al. 1 Thomas B. Novinger, C NW NW 26-33s-30w. Initial completion was for a bomb potential of 1,675 bbl. of oil per day after acid treatment with 500 gal. through casing perforations at 5,270-90 ft. in Marmaton limestone.

Structure

Novinger reef was deposited on a terrace above the Atokan-Morrowan series. This terrace is also reflected in the attitude of the eroded Mississippian-Chester surface shown in Fig. 1.

A series of small reefs were developed in rocks of Marmaton age on this stable platform area lying on the north shelf of the Anadarko basin. These include Novinger field, Flynn Oil Co. 1 School Land, SE SE SE 35-5n-23 E.C.M., and Carter Oil Co. and Emby Kaye 1 Sharp, C SE SE 31-6n-22 E.C.M. These reefs produce from porosity developed in tan to buff sucrosic, oolitic, oocastic, fossiliferous limestone.

Novinger structure comprises of two domes of about 50 ft. of closure, each lying along a north-south trending major axis. Dense shaly limestone cored in 3 wells determine northern productive limits. Southern limits of the south dome have not been defined; however, rigs are active at Columbian Fuel et al. 5 O. H. Vail, C NE SE 34-33s-30w, and 6 O. H. Vail, C NW SW 34-33s-30w. Other drilling rigs in the area include same interests 1 C. B. Vail, C SE SW 14-33s-30w, B-1 Armentrout, C SE NW 15-33s-30w, C-1 Meyer, C NW SE 16-33s-30w, 1 Patterson, C NE SW 17-33s-30w, an exploratory test, and 1 Gibler, C NW SE 20-33s-30w.

Structural relationships . . . Agnich[1] has cited the following principal structural relationships exhibited in some reef structures of the bioherm type:

1. Differential compaction in shales lying above the reef.
2. Diminution of magnitude of folding towards the surface of the earth.

Above the Novinger reef, marked thinning is evident in the interval between the top of the Lansing-Kansas City lime series and the top of the Marmaton reef. As shown in Fig. 3, this interval thins from a normal section of 826 ft. off of the flanks to as thin as 733 ft. on top of the north closure.

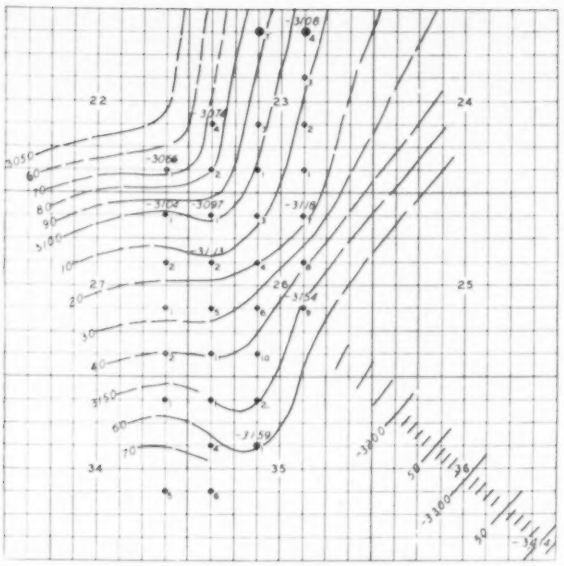
Diminution of magnitude of folding progressively in younger rocks is shown from a comparison of several structural maps in this article as follows:

Top of Lansing . . . Both closures of the Marmaton reef are poorly reflected as gentle terraces on top of the Lansing-Kansas City lime series in Fig. 4.

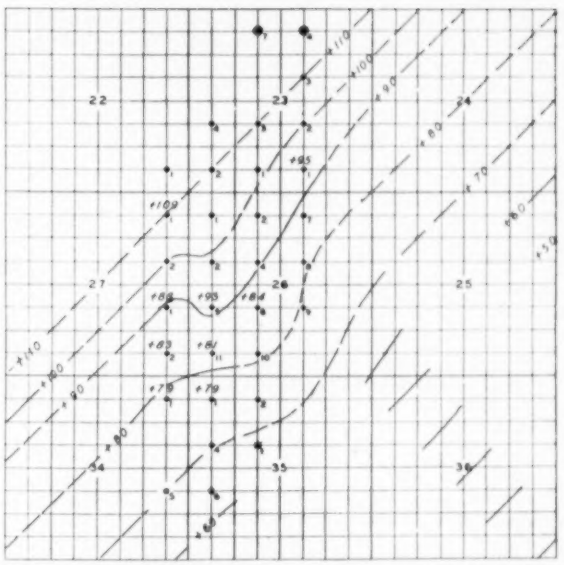
Top of Hollenberg . . . Structural evidence of reef building in Marmaton rocks have almost completely disappeared in Permian Hollenberg time. Fig. 5 shows only gentle interruption of the regional southeast dip over the closures at Novinger.

Stratigraphy

Strata of Chester age represent the uppermost Mississippian sediments at Novinger and these thicken progressively in a southeasterly direction into the Anadarko basin. Lithology is buff



TOP OF CHESTER structure of Novinger field shows terrace on regional southeast dip of Mississippian eroded surface. This terrace is similar to Atokan-Morrowan structure, the reef site (Fig. 1).



TOP OF HOLLENBERG limestone structure of Novinger field shows only slight interruption of regional southeast dip of this Permian marker (Fig. 5).

to gray, oolitic, crinoidal, fossiliferous, coarsely crystalline limestone interbedded with gray to brown shales.

Pennsylvanian system . . . Lowest Pennsylvanian rocks found in the Novinger field are the Atokan-Morrowan series which are found resting unconformably on the eroded Mississippian Chester surface. Atokan - Morrowan beds consist principally of black carbonaceous shales with occasional beds of brown to black cherty limestone. In many wells, a lenticular, fine to medium grained glauconitic sandstone occurs at the base of the series.

Des Moinesian series . . . A 250-ft. section of Cherokee limestone overlaps the Atokan-Morrowan series. Cherokee limestones are overlain by about 250 ft. of Marmaton strata which consist of white to gray, oolitic, cherty, fossiliferous, coarsely crystalline limestone.

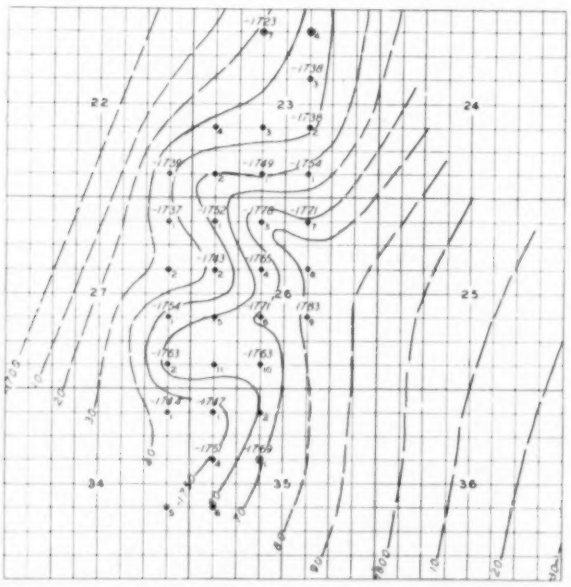
Missourian series . . . Lansing-Kansas City limestone sequences comprise the Missourian series at Novinger. These are composed of about 800 ft. of coarsely to finely crystalline, tan to buff, cherty, fossiliferous limestone, with intercalations of thin gray carbonaceous shales.

Virgilian series . . . Uppermost Pennsylvanian rocks at Novinger are comprised of Douglas, Shawnee, and Wabaunsee formations, in ascending order. Douglas group consists of variegated shales with intercalated thin coarsely crystalline beds of limestone.

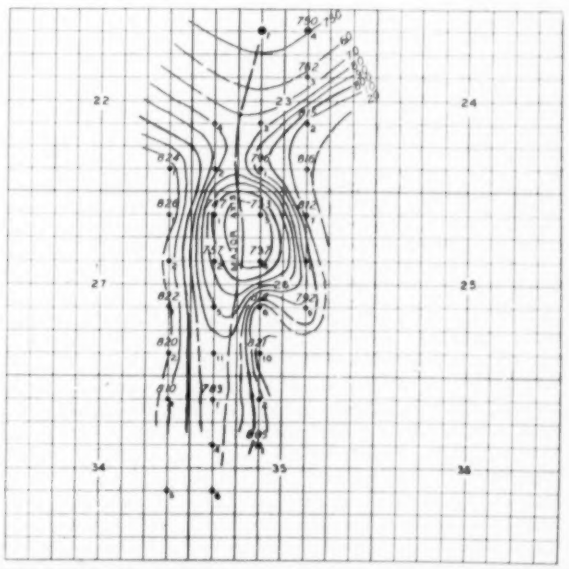
Shawnee group consists of gray to buff, slightly oolitic, coarsely crystalline limestone with abundant fusulinids.

Reference

1. Agnich, F. J., "Geophysical Exploration for Limestone Reefs," Geophysics, Vol. XIV, No. 4 (October 1949), pp. 486-500.



TOP OF LANSING-KANSAS CITY limestone structure shows gentle terraces in Pennsylvanian rocks draped over Marmaton bioherms (Fig. 4).



THINNING OF SECTION over Novinger structure is strikingly evident. Interval is top of Lansing-Kansas City lime series to top of Marmaton (Fig. 3).

CANADA

Medium Oil Discovery Reported at Berry Creek

Medium-gravity crude oil has been discovered in the Berry Creek area of southern Alberta, a few miles northwest of Cessford basal Colorado oil producers and 100 miles east of Calgary, by Amurex Oil Development Co. This exploratory well gave up 25°-gravity crude from the basal quartz section of the Lower Cretaceous during recent drill-stem tests.

The oil strike came at Amurex 1-14 Berry Creek, LSD 14, 13-24-13w4, 2¼ miles northwest of Amurex-Trans Empire-Cessford oil wells. Top of the basal sand was contacted at 3,271 ft., or 893 ft. subsea, and there was an estimated 10 ft. of oil pay zone. Initial drill-stem test, from 3,272-81 ft., gave up only drilling mud. Test from 3,288-99 ft. flowed gas in 20 minutes, at rate too small to measure, and 1½-hours recovery consisted of 360 ft. of gassy oil and 10 ft. of mud-cut oil.

Hole has now been carried down to 3,355 ft. and 5½-in. casing run to that depth. The basal quartz has been perforated from 3,290-98 ft. with 4 shots per ft., and crew is now awaiting installation of tankage preliminary to moving service rig to site for commencement of production tests to further evaluate the new strike.

Hamilton Lake . . . Redwater Utilities Holdings, Ltd., Davison Oils, Ltd., Merrill Petroleums, Ltd., and associates have discovered natural gas and obtained a showing of oil in the Viking sand at their exploratory driller in the northwest sector of Hamilton Lake, 130 miles northeast of Calgary.

The discovery well, Redwater - Davison - Merrill 14-20 Hamilton Lake, LSD 14, 20-35-10w4, lies 3 miles west and ½ mile south of the Homestead 6-26 H. B. Viking oil well. Drill-stem test in the Viking 2,948-66 ft., flowed gas at maximum rate 1,820,000 cu. ft. daily and gave a 1½-hour pipe recovery of 90 ft. of oil-cut mud. Second test, from 2,953-66 ft., did not flow gas, but gave a 2-hour pipe recovery of 110 ft. of oil-cut mud. Hole is now being deepened.

Wood River . . . Texaco Exploration Co.'s central Alberta discovery well in the Wood River area, 115 miles north-northeast of Calgary, has run initial potential tests, and is indicated as a marginal oil producer from the basal quartz. This well also showed a sizable gas cap, and flowed natural gas at rates in excess of 4½ million cu. ft. daily during drill-stem tests.

The well, Texaco A-1 Wood River, LSD 9, 6-43-23w4, 10 miles east of Ponoka, is 7 miles west-southwest of the Seaboard-Gulf-Samson Lake D3 oil discovery and that same distance southeast of the Western-Union 9-11 Samson basal quartz oil strike. Potential test at the Wood River well was run from the perforated interval 4,995-96 ft., through an 8/64-in. choke, and during 7-hour test produced at rate of 14.8 bbl. daily. Gravity of the oil is 39.5°.

Smiley area . . . Imperial Oil, Ltd., has been assured of a sizable oil producer at its light gravity oil strike in the Smiley area of Saskatchewan, 18 miles northwest of Kindersley. That well, a Viking oil discovery with some 20 ft. of pay zone, produced approximate 36°-gravity crude oil at rates between 97 and 102 bbl. daily during initial pump tests.

This Saskatchewan oil find, Imperial 7-15V Smiley, LSD 7, 15-31-25w3, lies 6 miles west of the Coleville heavy gravity oil region, and is in an area where natural gas exploration was under way. The Viking sand was contacted at 2,309 ft.

During a 14-hour pump test the well produced 60 bbl. of oil, at rate of 102 bbl. daily, while a later 15-hour pump run gave up 61 bbl. of oil, for rate 97.6 bbl. daily.

Latest Geophysical Report

The latest count of geophysical operations in western Canada lists 150 active crews in the western provinces, down seven from the previous report made in late summer. As of October 3 there were 108 seismographs, six gravitymeters, and one magnetometer operating in Alberta; 27 seismic crews, and two gravitymeters in Saskatchewan; four seismographs in British Columbia, and two in Manitoba. The total number of seismic units in the field was 141, eight gravitymeters, and one magnetometer.

Imperial Oil Co., Ltd., led the field with 21 seismic crews at work. Canadian Gulf Oil Co. ran second with 12 seismic and three gravitymeters. Socony - Vacuum Exploration Co. has 14 crews in the field, 12 seismic and two gravitymeter. Texaco Exploration Co. reported the same figures.

EASTERN CANADA

Gaspe . . . In the Gaspe Peninsula, Quebec Province, The 1 Asphalt base on the Galt Brook dome, sponsored by Gaspe Oil Ventures of Montreal, has discontinued testing a second show of black oil at 1,565-70 ft. and is deepening below 1,613 ft. Continental Oil Co. 1 deep test was shot at 3,198 ft. to correct hole, and deepening in fractured section with caving from upper shot holes under control. It is believed nearing contact of the Grand Greve and Bon Ami limestone. The 2 Bald Mountain is below 5,937 ft. with no change in formation, after a correctional shot at 5,927 ft.

MICHIGAN

A new Detroit River zone oil discovery well appeared to be assured at the Alan S. Gray 1 Clancy, NE SW SW 12-18n-12e, Hume Township, Huron County—one of two recent Thumb area discoveries in the Detroit River during recent weeks.

The Gray wildcat, on the basis of preliminary reports after acid treatment appeared to be by far the better of these two discovery wells both of which are still being tested. The other Huron County Detroit River wildcat oil discovery is the Alvin H. Weber & Muskegon Development Co. 1 Blondell, NW NE NW 29-15n-11e, Grant Township.

The 1 Clancy was reported to have pumped 30 bbl. of net oil and 50 bbl. of acid and load water first 24 hours after acid treatment with 2,000 gal. Two other 8-hour pump tests on successive days showed production of 17 bbl. of oil and 12 bbl. of water and 19 bbl. of oil and 11 bbl. of water. Well was not pumped off at the conclusion of any of these tests, and a good gas head was reported to be in evidence. Wildcat is being tested at 3,120 ft., plug-back depth, from 3,125 ft., with pay showing at about 3,111-18 ft. Wildcat is located on a 4,000-acre drilling block. Arrangements were being completed this week to start two offset wells to this new discovery, but exact location of these offsets was not announced.

The other area wildcat, the Weber & Muskegon Development Co. 1 Blondell, was being tested at 3,400 ft., plug-back depth from 3,900 ft., total depth, after a reacidization with 3,000 gal. Well was estimated to be good for about 6 to 8 bbl. of oil a day but did pump as much as 12 bbl. of net oil on initial tests following this last treatment. Pay section was reported to be showing from about 3,360 to 3,400 ft.

OKLAHOMA

More Testing Reported At Woods Discovery

Champlin Refining Co. 1 Dyer, NE NE SW 17-29n-17w, Woods County Simpson and Arbuckle discovery, has 7-in. casing set at 6,182 ft. and is plugged back to 6,163 ft.

A drill-stem test at 6,142-92 ft. recovered 180 ft. of mud and 270 ft. of muddy salt water with some free oil traces. A test at 6,134-63 ft. recovered 105 ft. of mud and 120 ft. of heavily gas-cut mud, no pressures. A test in the Arbuckle at 6,120-63 ft. flowed gas in 20 minutes with 90 ft. of 42°-gravity oil, 50 ft. of muddy oil, 180 ft. of heavily oil-cut mud, 90 ft. of heavily oil-cut mud with salty taste, and 30 ft. of muddy salt water, oil cut, recovered.

Noble Strike Tests

Production tests are getting under way at Avila Oil Co. 1 White, Noble first Wilcox sand discovery in C SE NW 32-22n-2e, 1½ miles north of Sumner. The discovery flowed 23 bbl. of oil in 8 hours on 10/64-in. choke.

McClain Test Has Good Bromide Sand Show

A McClain County wildcat, the K. A. Ellison et al 1 Community Featherstone, C NW SE 35-8n-4w, is drilling ahead at 10,656 ft. with Bromide sand pay assured on a drill-stem test at 10,535-90 ft. The strike flowed 3,500 M.c.f. of gas per day and oil at the estimated rate of 35 bbl. per day. This indicated discovery is in the Freeny pool area, 1½ miles to the north. Freeny pool's discovery well, Ellison 1 Tankersley, is located in C NE NW 25-8n-4w.

Garvin Pool Opened

Magnolia Petroleum Co. has a pool opener completed at 1 Allison, NW SW NW 22-4n-2w, Garvin County. The well flowed 320 bbl. of new oil per day through 12/64-in. choke from perforations at 6,524-64 ft.

First Production Test Reported at Cleveland Well

Continental Oil Co. 1 F. Cook, Jr., SW SE NE 15-8n-1w, Cleveland County Wilcox sand discovery, flowed from 1 ft. of perforations 96 bbl. of oil per day on 18/64-in. choke. The perforations in the Wilcox sand were at 7,181-82 ft.

Ashland Oil & Refining Co. is coring at 6,997 ft. at 1 Nance, Cleveland County second Wilcox discovery well in the SW SE NW 19-7n-1e. A drill-stem test at 6,971-78 ft. flowed gas in 10 minutes and oil in 75 minutes. Recovery on the 2-hour test was 6,500 ft. of free oil.

Production Proving Good at Middle Peck

Production is proving good at Lincoln County's Middle Peck pool on the northwest flank. Midstates Oil Corp. is completing 1

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Lucy Logan et al in the SE SE SE 28-14n-6e. Puckett Drilling Co. 2-B Harlow, NE NW NW 34, to the southeast, flowed at the rate of 10 bbl. of oil per hour through 28/64-in. choke. The 3-A Harlow, SW NE NW 34, flowed 18 bbl. of oil per hour on an 18/64-in. choke.

KENTUCKY

EASTERN KENTUCKY

On Pond Creek and in the Pike County sector of Big Sandy gas field, Columbian Fuel Corp. 31 Ford Motor Co., has been completed as a gas well with an open flow potential of 1,565,000 cu. ft. of gas with a 14-hour rock pressure showing 520 psi. Producing formation is the Big lime of Mississippian age topped at 2,663 ft. and bottomed at 2,940 ft. Total depth is 2,952 ft. Well was stage treated with 3,000 gal. acid.

ILLINOIS

Five new oil pools and two extensions to pools were discovered in Illinois during September, according to the State Geological Survey.

New pools were Melrose South in Clark County, producing from a Pennsylvanian sandstone; Decatur in Macon County, producing from the Silurian limestone; Calhoun South in Wayne County, Junction East in Gallatin County, and Ashley in Washington County, all producing from upper Mississippian sandstones. Extensions were completed to the Rural Hill West pool in Hamilton County and the Sailor Springs Consolidated pool in Clay County. The Aux Vases sandstone was opened up as a new pay in the Centerville pool in White County.

A total of 189 wells were completed during the four-week period September 2 to September 29, an average of 47 per week, as compared with 43 per week during the July 29 to September 1 period. Seventeen wildcats drilled more than 2 miles from production discovered 3 new pools; the other 2 new pools and the 2 extensions to pools were discovered by 28 wildcats drilled less than 2 miles from production.

Ninety-nine oil wells were completed in pools. This total includes 10 wells which had previously been completed as dry holes. Eight of the 10 were brought into production by use of fracture treatments.

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LOUISIANA

SOUTH LOUISIANA

Leeville Gets Extension

Deep production at Leeville, in Lafourche Parish, has been extended more than a mile to the north with a good oil producer completed by Placid Oil Co. at its 3 Desire Lagraise. The well, producing from casing perforations 10,392-411 ft., flowed at the rate of 300 bbl. of 34.2°-gravity oil per day through 9/64-in. choke on its completion gage. Leeville, with first commercial production in 1931, is one of the district's older and more extensively developed fields.

New Pay at Halter Island

Shell Oil Co. has opened a new and deeper gas-distillate reservoir for the Lake Halier area, Terrebonne Parish, with the completion of its 1 State Lease 2194. The well, the company's second for the area, flowed at the rate of 60 bbl. of 48°-gravity distillate and 4,839,000 cu. ft. of gas per day from casing perforations at 10,029-39 ft. The company's discovery well, completed last March, was completed in a sand at 7,540-49 ft.

Third Productive Zone Opened in Boutte Field

A new and slightly shallower pay zone, productive of gas-distillate, has been opened by Pan American Production Co. in its Boutte field, St. Charles Parish. The pay, open through casing perforations at 10,210-20 ft., is the third for the field with three wells completed. The other two pays are productive of oil.

The new-pay discovery well, 3 Simoneaux, on a 2-hour gage through 20/64-in. choke, flowed at the rate of 83 bbl. of 55.7°-gravity distillate and 2,132,000 cu. ft. of gas per day with tubing pressure at 1,100 psi. Location is northeast of the discovery well, 1 Simoneaux, completed last May from an oil-pay interval at 10,325-38 ft. The second well, 2 Simoneaux, a location east of the discovery well, and a location south of 3 Simoneaux, is an oil producer from a sand interval at 10,938-48½ ft. It was completed in July.

Pan American now is drilling at 3 Simoneaux, southwest of the discovery well.

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ROCKY MOUNTAIN

COLORADO

New Weld County Deep Test Allocated

Harry Royster, Denver independent and Rome Oil Co. have made location for 1 Littler, SE SE 34-4n-62w, a Lyons sand test in Weld County. The wildcat is southwest of Greasewood field, where there has been no previous deep drilling and is to go to about 8,100 ft.

NORTH DAKOTA

Amerada Completes Fryburg Discovery

Amerada Petroleum Corp. has completed the Mississippian discovery in the Fryburg area of Billings County for a gage of 217 bbl. of oil daily, flowing through 18/64-in. choke. The well, 1 May, C NW NE 9-139n-100w, is the first in North Dakota of any significance to be completed outside the Nesson anticline area.

Total depth was 13,325 ft. with production from the upper Madison at 9,408-29 ft. Lower zones had some shows, but no commercial encouragement. The wildcat is located on a deep seismic prospect, and is the first such success in the state.

At a northwest offset to the discovery Amerada is drilling below 8,742 ft. after having established possibly commercial production from the Heath sandstone.

New Pay Indicated in Beaver Lodge Field

Amerada recovered oil and oil and gas-cut mud from Red River of Ordovician area on test of 2 Kvam, C SW NE 19-156n-95w, deeper pool wildcat in Beaver Lodge field, for an indicated new pay discovery in North Dakota. Test of the zone 13,057-13,090 ft. reversed out 4 bbl. of high gravity oil, and 12 bbl. of oil and gas-cut mud, with 1,660 ft. of oil and gas-cut mud still in pipe. Tool was open 4 hours, under flowing pressure of 2,515-2,800 psi.

The operator is drilling ahead below 13,177 ft. Red River is productive in several areas of the Montana portion of the Williston basin, but North Dakota has had no previous production from the formation. Deep shows and production found in early drilling of the Beaver Lodge pool were in Devonian and Silurian horizons.

Charlson Area Stepout Completed

The Texas Co. has completed 1 Government Dorough, C SE SW 8-153n-95w, 1 mile northwest of production in the Charlson area of McKenzie County for a gage of 319 bbl. of oil per day, with production from Madison. The flow was through 18/64-in. choke, and is the best potential in this area to date. It is the best recovery recorded for any producer south of the Nesson anticline in North Dakota.

Mountrail County Wildcat Staked

L. R. Whitson of Dallas is moving in materials for an 8,700-ft. test of Madison at 1 Ritzke, SW NW 15-158n-93w, 5 miles east

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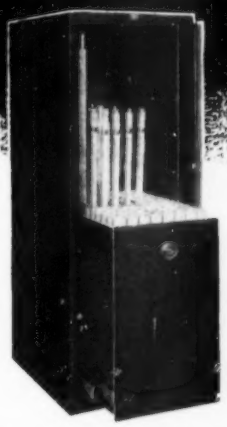

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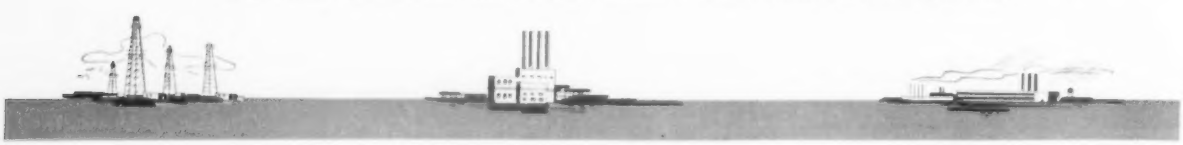

of production in East Tioga field. The well is on land farmed out by Stanolind Oil & Gas Co. and Stanolind and the Dallas operator will each retain an undivided half interest in the 3,200-acre block on which the well is located.

MONTANA

Daniels County Wildcat Abandoned

Carter Oil Co. has abandoned 1 Danielson, C NE SW 12-36n-47e, in Daniels County, the most recent test of the non-producing northeastern counties of the state. The well had slight shows in both Mississippian and Devonian formations, and casing was landed for thorough testing. Only salt water with a trace of black oil was found after acidizing the zone 7,323-60 ft. Total depth was 9,229 ft. and top of Devonian was found at 7,044 ft.

Shows in this wildcat were similar to those found in several northeastern Montana wildcats which have failed to produce, apparently because of lack of porosity and permeability in stained formations.

WYOMING

Southeast Sand Draw Discovery Completed

Sohio Petroleum Co. has completed 1 Unit, SE NW SE 36-32n-95w, in the Southeast Sand Draw area of Fremont County for a gage of 407 bbl. of oil daily, from Tensleep. Test was on swab. The well showed commercial quantities of oil in Phosphoria and made 3 to 5 million cu. ft. of gas per day on test of Frontier. Both these shows were cased off for completion in the deeper zone. Gravity of production is 22.2°. A confirmation well, presumably headed for Tensleep is drilling below 4,100 ft. with no tops reported.

NEBRASKA

Lyons Test Drilling In Enders Pool

Twin Oil & Rock Hill Oil are drilling below 1,500 ft. at 4 Wrede, NW SE NE 15-13n-55w, in Enders pool, Kimball County.

The wildcat will test Lyons sand, and will be the first deep test of the area. Deep wildcatting in both the Colorado and Nebraska areas of the Denver-Julesburg basin has materially increased since the apparent success of The California Co.'s confirmation well in the Black Hollow area of Weld County, Colorado.

APPALACHIAN AREA

WEST VIRGINIA

In Middle Fork district, Randolph County, West Virginia, Blaho Oil & Gas Co. 1 Dora Brown wildcat, elevation 2,550 ft., reached the Fifth sand 1,837-1,948 ft., gas at 1,943 ft., testing 84,000 cu. ft., after shot and shut down at 2,200 ft. In Roaring Creek district, 1 E. & M. Joyce estate, elevation 2,356 ft., drilled through this formation at 2,156-2,216 ft. with a show of gas at 2,190 ft., which will be shot. It is shut down at 2,404 ft. It is reported that a route for a pipe line 12 to 14 miles in length is now being laid out to market the gas in this field to one of the major gas companies in the east.

OHIO

The first straight gas well was completed in Shearer pool by National Gas and Oil Co. on 2 Millie Selders, 2nd Qr., Bethlehem Township, Coshocton County. Clinton sand was topped at 3,460 ft. and drilling stopped at 3,472 ft. with a gage of 2,000,000 cu. ft. natural.

In the Mt. Zion pool, the best well of the week was completed on 10 Wheeler Johnson, Section 24, Jackson Township, Knox County, by Mutual Oil and Gas Co. Clinton at 2,710-2,751 ft. was fractured and produced 301 bbl. in 24 hours.

Waverly Oil Works completed a combination well on the 1 (2) S. A. Mears, Lot 9, Hanover Township, Licking County. Clinton at 2,760-2,790 ft. made a fair showing of oil, and 250,000 cu. ft. natural and 30 bbl. of oil and 550,000 cu. ft. gas in 24 hours after fracturing.

TEXAS

WEST TEXAS

Borden County Well Showing Reef Oil

Vickers Petroleum Co. 1 Canning, 14 miles west of Vincent in eastern Borden County, had prospects of oil in a Pennsylvanian reef section. Sample-top on the Pennsylvanian was called at 6,900 ft. and top on the reef was 7,105 ft. on elevation of 2,345 ft. On a 4-hour drill-stem test between 7,212-7,310 ft. the drill pipe unloaded oil and fluid while coming out, and recovery was 1,530 ft. of clean oil, 900 ft. of oil-cut salt water and mud, plus 4,640 ft. of salt water. Operators were checking electrical surveys. Location is approximately 2 miles west of the Diamond M field, and a long south offset to a Wolfcamp well.

In western Borden County, Ryan & Burke 1 Cannon entered a reef structure at 8,335 ft. and tested salt water with no shows between 8,334-90 ft., total depth.

Howard County . . . Second well to reach Pennsylvanian reef pay in Oceanic field is Oceanic Oil Co. et al 2 Winans, north offset to the firm's discovery, was figured 21 ft. low on structure to the discovery, but was expected to have around 100 ft. of pay above the water level. Tentative top on the reef was 8,134 ft., or minus 5,468 ft. Operators ran casing on bottom at 8,165 ft. before testing.

Phillips Petroleum Co. 1 Reef-A, west offset to 1 Winans, had mechanical trouble on its first drill-stem attempt in the reef. Top of the reef was 8,156 ft. by samples.

Reeves County . . . Magnolia Petroleum Co.'s long-testing 1 Marvin Rape, 12 miles west of Coyanosa and 16 miles south of nearest production, has been plugged back and completed in Wolfcamp limestone. Based on a 19-hour pumping gage, daily potential was 140 bbl. of 42° oil, plus 50 bbl. of acid water. Total depth was 11,258 ft., top of the Wolfcamp was 10,085 ft. on elevation of 2,727 ft. Production was coming from perforations at intervals between 10,080-10,882 ft. and open-hole section between 11,109-11,114 ft.

Andrews County . . . Magnolia Petroleum Co. et al 2-EA Fasken, northwest of Midland Farms field and a long southeast extension to new Ellenburger and Devonian discoveries, had 50 ft. of Ellenburger pay, by drill-stem tests.

Top of the Ellenburger was 12,597 ft. and first test from 12,593-12,612 ft. recovered 2,100 ft. of oil in 2 hours. Second test at 12,612-12,627 ft. flowed 27½ bbl. of oil in 1 hour and 15 minutes, and from 12,627-12,638 ft. the well flowed 40 bbl. of oil in 2 hours. Last test at 12,638-12,648 ft. recovered 240 ft. of oil. Operators were running liner to bottom for completion tests.

SOUTHWEST TEXAS

New Producer Extends North Willman Oil Pay

Luling Oil & Gas Co. and Glen A. Martin are extending oil production of San Patricio County's North Willman field approximately 3,600 ft. to the southwest at their 1 Brown, now preparing to test indicative showings encountered in the field's Vicksburg pay sand at 4,632-45 ft.

A 10-minute drill-stem test of the pay made prior to running the oil string got a good flow and recovered 3,500 ft. of clean oil. The test, taking in an interval at 4,639½-46 ft., was made through ¾-in. chokes with 35 psi. working and 1,625-psi. bottom-hole pressure. Hole is bottomed at 4,648 ft. and has casing run to 4,646 ft.

The field, discovered in May 1952, produces gas from lower Frio sand at 4,025 ft. and oil from the Vicksburg at 4,600-4,700 ft.

TEXAS GULF COAST

New Refugio County Area Gets Active Development

The newly opened producing area southeast of Refugio, in Refugio County, is getting an active play with two wells already completed, two others in or near the pay horizon, and locations made for two additional wells.

Latest completion is by Chicago Corp. at its 1 Lawrence O'Connor estate, 660-ft. north offset to Humble Oil & Refining Co.'s discovery well, 1-B Mary Ellen O'Connor, completed two weeks ago. Both wells, however, were drilled almost simultaneously, reached the pay zone about the same time, and may be called co-discovery wells of the area.

Chicago Corp.'s well flowed 132 bbl. of 39°-gravity oil per day through 9/64-in. choke with 500-psi. pressure on the tubing and had a gas-oil ratio of 606 cu. ft. per bbl. Pay zone is open through casing perforations at 5,856-60 ft.

The previously completed Humble well flowed 123 bbl. of 36.7°-gravity oil per day through ⅛-in. choke with 800-psi. pressure on the tubing and gas-oil ratio of 749 cu. ft. per barrel from casing perforations at 5,866-76 ft.

Humble is in the pay zone at its 2-B O'Connor, 1,273 ft. southeast of its initial well, and is near the pay at its 1-A O'Connor, 933 ft. northeast of the discovery, which is 660 ft. east of Chicago Corp.'s well. This company has locations for 3-A O'Connor, 1,393 ft. east of its 1-A O'Connor, and 3-B O'Connor, 1,212 ft. east of 2-B.

The new area, a mile west of the south end of the Melon Creek field, has not been officially named. Humble has requested the name of "Mary Ellen O'Connor," while Chicago Corp. has asked that the field be named "West Melon Creek."

NORTH TEXAS

New Wells Completed In Nolan, Fisher Counties

White Flat field of northeast Nolan County received another Cambrian well at Honolulu Oil Corp. 1 Whittaker, which at this report had made two oil flows. Location is ½ mile southwest of American Trading & Produc-

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tion Corp. 1 and 2 Little wells, Cambrian discoveries for the area.

First drill-stem test in the Cambrian section from 5,511-43 ft. had gas in 2 minutes, mud in 5 and oil in 6 minutes. It cleaned into pits for 2 minutes, then tanked 110 bbl. of clean oil with no water during the next hour. Choke size was not reported.

Second test, still in Cambrian sand, from 5,541-73 ft., had flowing oil in 8 minutes and tanked 80 bbl. of oil in 1 hour.

Like the 2 Little, Wilberns sand discovery, this well also had flowing oil from the Strawn, at 5,152-82 ft. Field sources said the well missed both the Caddo section of the Pennsylvanian and the Ellenburger.

New work for Nolan County included a 6,000-ft. project by American Trading & Production as 3 Jessie Little, on the west side of White Flat field and one location west of its Cambrian discovery. Deep Rock Oil Corp. will drill 1-A Georgia School of Technology as a 7,500-ft. wildcat in 89-24-T&P Survey, 8 miles southeast of Loraine in eastern Nolan County. Drill site is 5½ miles southwest of Skelly Oil Co. 1 Alexander, dry hole at 7,202 ft.

B. A. Duffey and Union Oil Co. of California have filed application to drill a north offset to their 1 Evelyn Cox, recent Canyon sand discovery 12 miles southwest of Sweetwater. No. 1 Cox completed for 307 bbl. of oil a day from pay at 5,240-76 ft.

Fisher County . . . A west outpost to Paul Hunter reef limestone pool was in prospect at Claude Heard, Estill Heyser Jr. and Noranda Oil Corp. 1 Mattie Key. A drill-stem test between 5,530-60 ft. in Pennsylvanian lime had oil at the surface in 60 minutes but was not flowed. Fluid in the drill pipe included 490 ft. of salt water. Operators continued drilling below 5,631 ft. The same operator's 4 Bert Rushing, south offset to the pool opener, was dry at 5,881 ft.

CALIFORNIA

Uniting of Sansinena-Brea Fields Moved Step Nearer

Uniting of Sansinena production with the Puente area of Brea field moved a big step nearer with the completion of a new pool ½ mile east of the main Sansinena producing area. While additional drilling will be required to determine if production will be continuous, largest gap in the link area between the two Los Angeles County fields is approximately ½ mile.

Latest extensioner was Union Oil Co. 8-B-1 in NE NE 33-2s-10w. Drilled to 5,618 ft., it flowed 443 bbl. of fluid through a 48/64-in. choke, cut 14 per cent with water. Production was from a Miocene sand at about 5,077-5,315 ft.

Union has started 8-B-2 Sansinena as an eastern offset in NW NW Sec. 34. In the Brea area Shell Oil Co. C 16 and C 17 Puente were nearing completion in SW Sec. 34 and Shell D-1 Puente has been staked as a southeast offset to 8-B-2 Sansinena.

New Pool for Edison Field

While the wildcat was coring deeper in search of Vedder sand production, a Standard Oil Co. of California test apparently has opened a new Pyramid Hills pool in the Edison area of Kern County. On a 1-hour formation test at 5,916-36 ft., 47-8 Jeppi-Camp flowed 42°-gravity crude at an estimated 500 bbl. daily rate. The wildcat is about ½-mile southwest of Crown Drilling Co. 76-8 Jeppi-Camp which was completed in the Pyramid Hills pay last December for a 300 bbl. producer.

New Rincon Find Recorded

The old Rincon field of coastal Ventura County has yielded a new offshore oil pool. General Petroleum Corp. 11 Ferguson, first completed in 1944 at 3,300 ft., was plugged back and recompleted in the Miley shale. Initial production of 64 bbl. daily, 30°-gravity crude, was through perforations at 2,983-3,036 ft.

New Los Angeles Field

General Exploration Co. has opened a new oil field near Bandini, about 1 mile west of East Los Angeles field. The wildcat, 1 C.C.M.O. in 17-2s-12w, flowed at the daily rate of 500 bbl. on a 21-hour test. The flow of 38°-gravity crude was through a 18/64-in. bean, coming from the interval 6,277-6,317 ft.

Union Stakes Eocene Test

Union Oil Co. has staked a new Eocene test near Santiago in Southwest San Joaquin Valley, the third recently announced wildcat for the area. Union 48-8 Hudson will be drilled in 8-10n-23w, about 5 miles southwest of Santiago production, and is expected to find Eocene rocks at about 4,000 ft. Richfield Oil Corp. will drill 1 Moore to about 8,000 ft. in 32-11n-24w, and its 2-d San Emideo has been staked in 3-10n-21w, about 1 mile southwest of the Pleito Creek field.

NEW MEXICO

SOUTHEAST NEW MEXICO

Delaware Basin Deep Test Finished

Richardson & Bass 1 Fidelity-Federal, deep wildcat in 27-21s-29e, Eddy County, which has undergone extensive tests to total depth of 15,611 ft., has been plugged back and completed as a shallow producer.

Final plug back was to 6,980 ft. Perforations were from 6,890-6,950 ft. and four daily gages, through ¼-in. choke were 136, 117, 124, and 34 bbl. of oil, with water down to 9 bbl. on the last test.

Stanolind Oil & Gas Co. has scheduled two new wildcats for Eddy County. No. 1-AD State in 10-19s-28e is located 4 miles northeast of the firm's 1-AB State, recently completed Pennsylvania gas-distillate discovery. Projected depth is 13,500 ft. to test the Devonian.

Stanolind 1-AE State will drill to 10,300 ft. Location in 32-17s-28e is a south outpost to gas-distillate production.

Lea County . . . Western Natural Gas Co. 1 Edison, 35-16s-35e, has completed as a Devonian discovery, flowing 840 bbl. of 59° oil a day through ½-in. choke from perforations at 12,482-12,600 and 12,632-60 ft. Location is 4 miles southeast of Townsend Wolfcamp pool.

Second Devonian producer for Anderson Ranch field has been chalked up by Continental Oil Co. at its 3 Anderson Ranch. Completion potential was 100 bbl. of oil daily through 20/64-in. choke from perforations between 13,370-13,460 ft. The location offsets the Wolfcamp discovery for the area.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

Atascosa County: Robert S. Hays 1 Patton, Block 53, Natascosa Colony Farms Subd. Dry. TD 1,921 ft.

Caldwell County: Coulston Drilling Co. 1 Luling Foundation, Isaac Weldon Sur. Dry. TD 2,868 ft.

Frio County: Drilling & Exploration, Inc., 1 Foster, John A. Pragnlin Sur. 1380, A-1092. IPP 46 BOPD, 39.5°, casing perforations 3,431-42 ft. and 3,448-59 ft. TD 3,482 ft. (Extends Big Foot field.)

R. B. Lack 1 W. R. Hindes est., John H. Gibson Sur. 1813, A-998. Dry. TD 6,460 ft.

Medina County: J. W. Alsobrook 1 Hood et al, Weneslado Pacacho Sur. 761. Dry. TD 887 ft.

Wherry & Green 2 Schmidt, F. Vanderstucken Sur. 336, A-991. Dry. TD 890 ft.

Williamson County: C. C. Gilger et al 1 Patschke, Jesse White Sur., A-650. Dry. TD 1,825 ft.

TEXAS GULF COAST

Bee County: Union Oil Co. of California 1 Peterson, B. Q. Hadley Sur. 198. Dry. TD 6,910 ft.

Fayette County: Continental Oil Co. 1-C Arnim, Adam Zumwalt Sur., A-118. Dry. TD 5,438 ft. (Extension test in Arnim area.)

Sutton Drilling Co. 1 Arnim, M. C. Salina Sur., A-288. Dry. TD 2,254 ft. (East Arnim area.)

Fort Bend County: Texas Pacific Coal & Oil Co. 1 Wood, H & TC Sur. 9, A-211. Dry. TD 8,920 ft.

Goliad County: Bert Fields 1 Curtis, Henry Winchester Sur., A-44. Dry. TD 2,222 ft.

Dallas Husky 2 Gurley, Noah G. Stebbins Sur., A-256. Dry. TD 4,856 ft.

Grimes County: Woodley Petroleum Co. 1 Cockrell et al, Lot 11, Sanders Walker Sur. 474. Dry. TD 8,503 ft.

Harris County: Delhi Oil Corp. 1 Metzler, George Galbraith Sur., A-22. Dry. TD 6,985 ft. (East Huffsmith area.)

Michel T. Halbouty 1 Griffith, T. W. Marshall Sur., A-540 (northeast flank Humble dome). Dry. TD 8,873 ft.

Liberty County: The Texas Co. 1 Baldwin, E. D. Pruitt Sur. 122, A-485. (North Dayton area.) Dry. TD 12,200 ft.

Socs Vratis 1 Farris, Isaiah Fields Sur., A-35. Dry. TD 7,546 ft.

Live Oak County: Barry & Moore 1 Jones, AB & M Sur. 271, A-62. Dry. TD 4,452 ft.

Chizum, Rhodes & Hicks and W. M. Averill, Jr. 1 Jackson, M. M. Shipp Sur. 278, A-671. Dry. TD 4,935 ft.

Matagorda County: Lenior M. Josey, Inc., 2 Pierce estate, Daniel Rawls Sur., A-83. Dry. TD 9,110 ft.

Refugio County: Chicago Corp. 1 Lawrence W. O. Connor estate, George Latham Sur., A-209. IP 132 BOPD, 9/64-in., 39°, casing perforations 5,856-60 ft. TD 7,600 ft. (New field.)

Humble Oil & Refining Co. 1-B Mary Ellen O'Connor, George Latham Sur., A-209. IP 123.42 BOPD, ¼-in., 36.7°, casing perforations 5,866-76 ft. TD 6,000 ft. (New field.)

EAST TEXAS

Cherokee County: Gas & Oil Exploration Co. 1 Southern Pine Lumber Co., J. E. Stephenson Sur., A-1066. Dry. TD 5,369 ft.

C. O. Pollard estate 1 Ellen Jarvin estate, Isaac Kendrick Sur., A-417. Dry. TD 3,900 ft.

Franklin County: Hollandsworth Oil Co. 1

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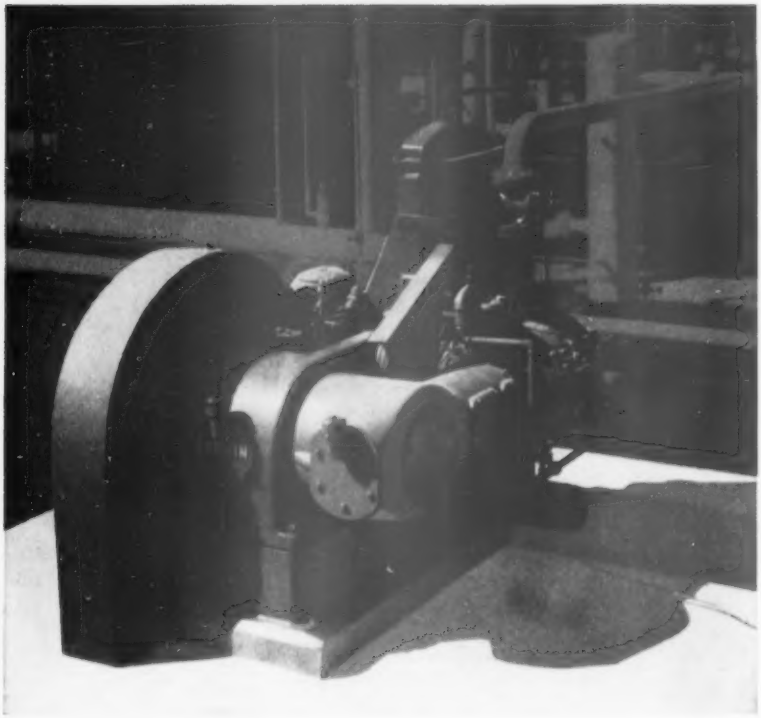

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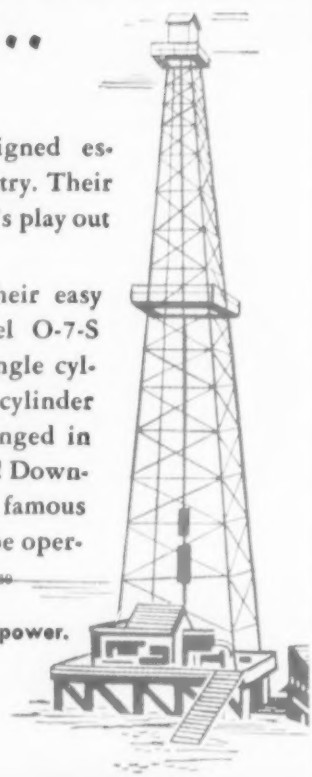

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WILDCAT COMPLETIONS

Aldridge, C. H. Simms Sur., A-417. Dry. TD 6,205 ft.

Hunt County: Stephens, Peveto and S. A. Cochran 1 Roy White, J. C. Sadler Sur., A-953. Dry. TD 3,632 ft.

WEST CENTRAL TEXAS

Brown County: T. J. Burgess et al 1 Ford, Sec. 11, HT&B Sur. IPP 7 BOPD, 43°, to pay 954 ft., sand. TD 962 ft. (Oil well.)

Callahan County: H. A. Birdwell and Son Drilling Co. et al 1 Baxter et al, Rebecca Edwards Sur. 778. Dry. TD 1,447 ft.

Johnson & Warren 1 Shrader, Matilda Cherry Sur. 1. Dry. TD 1,800 ft.

Coronet Oil Co. 3 Morris-Hemphill, Sec. 66, Blk. 2, GH&H Sur. Dry. TD 2,529 ft.

Reigle & Henderson 1 Haynes, Blk. 13, Wm. Willingham Sur. Dry. TD 1,050 ft.

Sandor Petroleum Co. 1 Jewell & Sue Smith, Sec. 25, BBB&C Sur. Dry. TD 3,002 ft.

G. W. White and R. J. Caraway 1 Greer, M. Lappe Sur. 744. Dry. TD 1,993 ft.

Jones County: Baldridge and Moran and Son, Inc. 1 Lambert, G. Martinez Sur. 194. Dry. TD 2,380 ft.

Geochemical Surveys and Gas & Oil Exploration Co. of Texas 1 Childers, 13-17-T&P. IP 499 BO/20 hours, 42°, top pay 4,525 ft. TD 4,995 ft. (Oil well.)

V. C. Perini, Jr. et al 1 Boaz, W. D. Irvine Sur. 213. Dry. TD 3,450 ft.

S. W. Petre 1 White, 36-16-T&P. Dry. TD 2,496 ft.

Nolan County: General Crude Oil Co. 1 Ussery, 310-64-H&TC. IPF 113 BOPD, 1-in. choke, 43.2°, top pay 4,162 ft. TD 6,487 ft. (Oil well.)

Union Oil Co. of California and B. A. Duffey 1 Cox, 91-22-T&PRR. IPF 307 BOPD, ½-in. 41.5°, top pay 5,240 ft. TD 5,333 ft.

Parker County: T. Jack Foster 1 Herring, A. B. Blackburn Sur. A-163. Dry. TD 4,510 ft.

Shackleford County: West Central Drilling Co. and B. W. Fitzgerald 2 Hendricks, 159-ETRR Sur. Dry. TD 1,604 ft.

Taylor County: C. M. Ashby et al 1 Carr, James V. Vaughn Sur. 45. Dry. TD 1,829 ft.

NORTH TEXAS

Clay County: A. D. Britton 1 Zihlman, Lot 37, Blk. 2, Clark & Plumb Subd. Dry. TD 4,751 ft.

Cooke County: W. O. Russell and R. W. Brown 1 Leazer, Amos Thames Sur., A-1010. Dry. TD 1,481 ft.

Grayson County: S. A. Winfrey et al 1 Reynolds, P. Stroh Sur., A-1135. IPP 34 BOPD, 23°. TD 3,282 ft. Top Strawn pay 3,267 ft. (Oil discovery.)

Jack County: Rock Island Refining Corp. and Luke Grace Drilling Co. 1 Carpenter, J. Cook Sur., A-152. Dry. TD 3,751 ft.

The Texas Co. 1 Martin, Lot 4, Navarro CSL Sur., A-443. IPP 39 BOPD, top pay 2,985 ft., 41.1°. TD 2,991 ft. (Oil discovery.)

Montague County: Byrd Oil Corp. 1 Heath, Sec. 12, Limestone CSL Sur. Dry. TD 6,698 ft.

Wichita County: Paul Bilbrey and Wayne Albritton 1 Brockreide, Blk. 325, Waggoner Col Subd. Dry. TD 1,700 ft.

I. Dee Campbell 1 Hooks, Blk. 118, R. J. Scott Sur., A-255. Dry. TD 1,840 ft.

G. E. Kadane and Sons et al 1 Robinson, Subd. 171, Waggoner Colony Lands. Dry. TD 6,555 ft.

Wise County: Johnny Mitchell and O. P.

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WILDCAT COMPLETIONS

Leonard 1 Busey, D. Casanove Sur. A-152. IP 1,690 M.c.f. of gas per day plus 10 bbl. distillate, top pay 5,961 ft., ¼-in. choke, conglomerate gas sand 5,891-5,909 ft. TD 6,307 ft. (Gas discovery.)

Noel Pautsky et al 2 Boyer, J. C. Smith Sur. A-745. Dry. TD 4,437 ft.

Young County: Hayden Farmer 1 Leberman, Sec. 154, TE&L Sur. A-401. Dry. TD 1,005 ft.

Shippers Warehouse Co. 1 J. W. Bullock estate, TE&L Sur. 343, A-590. Dry. TD 4,820 ft.

WEST TEXAS

Coke County: Kewanee Oil Co. et al 1 Anderson, Sec. 431, Blk. 1-A, H&TC. Dry. TD 6,303 ft. Ellenburger 5,948 ft.

Kent County: Lomax & Hunt 1 Mays, 35-4-H&GN. Dry. TD 6,920 ft.

Glasscock County: C. L. Norsworthy, Jr. 1 McDowell, 29-34-T-2-S-T&P. Dry. TD 11,023 ft. Ellenburger 10,654 ft.

Gaines County: Duncan Drilling Co. 1 Witmer, 15-A-12-PSL. Dry. TD 4,480 ft. San Andres 4,404 ft.

Crockett County: E. G. Rodman and Trebol Oil Co. 1 Noelka, 10-PP-TCRR. Dry. TD 2,104 ft.

Harry J. Russell 1 Baggett, 56-OP-GCASF. Dry. TD 1,478 ft.

Dickens County: Tri-Service Drilling Co. et al 1 Grantham, 234-1-H&GN. Dry. TD 7,481 ft.

Lubbock County: Humble Oil & Refining Co. 1 Parr et al, 143-12-EL&RR. Dry. TD 10,557 ft. Ellenburger 10,458 ft.

Lynn County: Claude E. Heard and Estell S. Heyser, Jr. 1 Lumsden, 143-12-EL&RR. IPP 237 BOPD, to pay 9,852 ft., 42.2°. TD 9,930 ft. Strawn 9,825 ft. (Oil well.)

Martin County: McElroy Ranch Co. 1 Kelley, 18-36-T-1-S-T&P. Dry. TD 4,120 ft. San Andres 3,909 ft.

Runnels County: Thos. D. Humphreys & Sons, Ltd., 1 Cora Byers et al, 146-ETRR-A-1277. Dry. TD 3,972 ft.

United Production Co., Inc. 1 Davis, Elisha Mather Sur. 535. Dry. TD 4,547 ft.

Schleicher County: Edwin P. Cox 1 Runge, 67-M-GH&SA. IPF 339 BOPD, ¼-in. choke, 42°, top pay 5,550 ft. Strawn 5,496 ft. TD 5,594 ft. (Oil well.)

Superior Oil Co. 1-25 Powell, 25-A-AB&M. Dry. TD 890 ft.

Sterling County: Harris & Walton 1 Davis, 3-T-T&P. IPP 36 BOPD, top San Andres pay 1,418 ft. TD 1,513 ft. 33°. (Oil well.)

Sutton County: Sinclair Oil & Gas Co. 2 Hunt, 71-14-TW&NG. Dry. TD 6,500 ft.

MICHIGAN

Arenac County: Frank E. Roush A-1 Roush, SW SW SW 26-18n-4e. Dry. TD 3,090 ft. in Dundee.

Bay County: Thumb Drilling Co. 2 Boeing et al, SW NW NW 26-18n-3e. Dry. TD 3,052 ft. in Dundee.

Gladwin County: Sun Oil Co. A-3 State-Bentley, NW NW SW 21-17n-2e. Dry. TD 4,122 ft. in Richfield.

Newaygo County: Admiral Oil Corp. 1 Gerdes, NW NE NW 12-13n-14w. Dry. TD 2,343 ft. in Traverse.

Ottawa County: P. K. Degenther 1 Hirdes, NW NW SE 28-6n-14w. Dry. TD 1,695 ft. in Traverse.

SOUTHEAST NEW MEXICO

Eddy County: Robert W. Atha 2 Magnolia-State, 14-21-27. Dry. TD 563 ft.

FLORIDA

Santa Rosa County: W. Appleman and Clinch Drilling Co. 1 U.S.A., SE SW NE 1-3n-27w. Dry. TD 6,509 ft. Elev. 130 ft., Chalk 3,454 ft., Eutaw 5,015 ft., marine Tuscaloosa 5,773 ft., Massive 6,143 ft., lower Cretaceous 6,410 ft.

GEORGIA

Telfair County: Paul Parson-Koake 1 Spurlin, Land Lot 260, Land District 7. Dry. TD 4,008 ft. Elev. 241 ft., Eagle Ford 2,750 ft.

Walker County: T. P. Posey 2 Close, Land Lot 33, Land District 7. Junked hole. TD 220 ft.

MISSISSIPPI

Carroll County: N. B. Hunt 1 Phillips, C NW NE 33-18n-3e. Dry. TD 4,209 ft. Elev. 410 ft., Eutaw 3,435 ft., Tuscaloosa 4,145 ft.

SOUTH LOUISIANA

Cameron Parish: The Texas Co. and Alfred C. Glassell, Jr. 4 Comegys et al, 7-13s-3w. IP 97 BOPD, 8/64-in., 33°, casing perforations 5,296-5,304 ft. TD 6,355 ft. (New pay in Grand Lake field.)

Jefferson Davis Parish: H. L. Hunt 1 Lock-Moore Co., 34-7s-6w. IP 209 BOPD, ⅛-in., 26.5°, casing perforations 9,298-9,314 ft. TD 9,500 ft. (New field.)

Lafourche Parish: California Co. 64 Delta Farms, 24-16s-22e (Delta Farms area). Standing TD 10,600 ft.

California Co. and Superior Oil Co. 1 Cloverly, 45-18s-21e. IP 308 BOPD, 9/64-in., 34.2°, casing perforations 11,534-43 ft. TD 12,615 ft. (New field.)

St. Bernard Parish: O'Meara Brothers 1 State Lease 2192, Township 16s-17e. IP 1,475 M.c.f. daily, ⅛-in., casing perforations

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WILDCAT COMPLETIONS

8,401-06 ft. TD 10,007 ft. (New field.)

St. Mary Parish: Southern Natural Gas Co. 1 Placito Tamporello, 37-15s-9e. IP 7,000 M.c.f. daily (with heavy spray of distillate), ¼-in., casing perforations 11,071-81 ft. TD 12,736 ft. (New field-Bakerstown.)

Terrebonne Parish: Shell Oil Co. 1 State Lease 2194, Township 19s-12e. IP 60 BOPD, 16/64-in., 48°, casing perforations 10,026-39 ft. TD 12,500 ft. (New pay in Halter Island field.)

NORTH LOUISIANA

Bossier Parish: Hargrove Oil & Gas Co. 1 Lodwick, C SE SE 8-19n-11w. Dry. TD 5,106 ft.

Catahoula Parish: W. H. Bryant et al 1 International Paper Co. "B," C NW NE 36-11n-5e. Dry. TD 4,953 ft.

Claiborne Parish: Continental Oil Co. 1 Muslow O. Co., 1,650 ft. N and 2,310 ft. W SEc 36-21n-8w. Dry. TD 6,549 ft.

Concordia Parish: Hunt Oil Co.-Gulf Refining Co. 9 Angelina Hardwood Co. "C," C SW SW 17-4n-7e. IPF 165 BOPD, Wilcox 6,777-80 ft., 41.7°, ⅛-in. TD 7,300 ft. (Opens Bee Brake pool.)

Sabine Parish: Natural Gas & Oil Corp. 1 Whitney Corp., C NW SE 4-9n-14w. Dry. TD 2,968 ft.

Winn Parish: Justiss-Mears Oil Co. 1 Tremont Lumber Co. "D," C SW SE 8-10n-1e. Dry. TD 3,250 ft.

ARKANSAS

Union County: Curtis A. Kinard et al 1 Warren, C NW SW 27-17s-17w. Dry. TD 7,440 ft.

OKLAHOMA

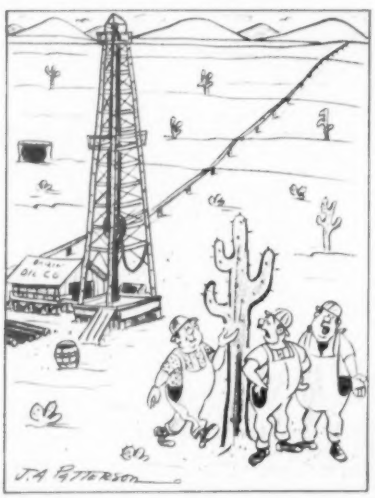
Alfalfa County: Vierson & Cochran 1 Angle, SE NE 14-28n-9w. Dry. TD 5,130 ft.

Osage County: Waite Drilling Co. 1 Osage, SW SW NE 17-20n-11e. IPP 6 BOPD, Burgess sand 2,181-91 ft., Mississippi lime 2,195-99½ ft., 38°. TD 2,660 ft. (Oil discovery.)

Halbert & Evans 1 Osage, NW NW SW 4-23n-6e. Dry. TD 3,004 ft.

Pawnee County: Nadel & Gussman 1 Huffington, SW SW SW 12-20n-5e. Dry. TD 3,280 ft.

Dale Murlin Moody 1 Dale Moody-Gar-



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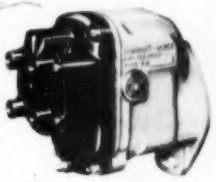

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WILDCAT COMPLETIONS

lington, SW NE NW 31-22n-7e. Dry. TD 3,146 ft.

Seminole County: The Texas Co. 1 Dameron, NW NW NE 14-5n-5e. IPF 205 BOPD, Sylvan 2,701-12 ft., 35.5°, ⅛-in. TD 3,185 ft. (Oil discovery.)

MISSOURI

St. Louis County: Laclede Gas Co. 3 Lange, 6-47n-7e. Dry. TD 3,245 ft. (Gas storage well.)

KANSAS

Barton County: Northern Ordnance 1 Maneth, SW SE SW 11-18s-15w. Dry. TD 3,591 ft.

Ellis County: El Dorado 1 Scheck, NW NW SW 16-13s-16w. Dry. TD 3,593 ft.

D. G. Hansen 1 Wellbrock, SW SW SW 31-14s-16w. Dry. TD 3,528 ft.

Oil Producers, Inc. 1 Dinkel, SW SW SW 21-15s-17w. Dry. TD 3,640 ft.

Pawnee County: Musgrove 1 Schartz, NW NW NW 20-22s-16w. Dry. TD 4,167 ft.

Reno County: George Siegrist 1 Wilson, NW NW SW 23-23s-4w. Dry. TD 3,628 ft.

Rooks County: E. H. Riggs 1 Collins, NW NW SW 6-8s-18w. Dry. TD 3,520 ft.

Saline County: D. T. Ingling et al 1 Mortimer, NE SE SW 33-15s-1w. Dry. TD 2,648 ft.

Sedgwick County: Trans-Era 1 Janzen, NW SE NE 27-28s-2w. Dry. TD 4,185 ft.

Trego County: Pam-Kar 1 Hixson, NW NW NE 19-11s-22w. Dry. TD 3,952 ft.

NEBRASKA

Cheyenne County: James P. Sloss 1 Smith, NE NE NE 31-13n-53w. Dry. TD 5,945 ft. Skull Creek 5,932 ft.

NORTH DAKOTA

Ramsey County: Calvert Exploration Co. 1 W. Haley, C SW SW 1-153n-63w. Dry TD 3,252 ft. Winnipeg sand 3,211 ft.

Williams County: Amerada Petroleum Corp. 1 N. Dakota "B," C NE SW 36-154n-96w. Dry. TD 8,514 ft. Madison 8,179 ft.

CALIFORNIA

Kern County: E. A. Bender 1 Joughin, 1-27s-28e. Dry. TD 1,007 ft.

Coast Line Oil Co. 1 Well, 22-11n-18w. Dry. Santa Margarita 444 ft., basement 1,555 ft., TD 1,570 ft.

Fraser & Paulsen 1 Bowles, 23-26s-28e. Dry. Vedder 565 ft., basement 1,023 ft., TD 1,028 ft.

Intex Oil Co. 1 Glide, 19-26s-28e. Dry. Vedder 1,910 ft., TD 1,922 ft.

H. H. Magee, Opr. 3 Glide, 35-27s-28e. Dry. TD 1,350 ft.

Tide Water Associated Oil Co. 22-8 S. F. & F. L., 8-25s-20e. Dry. TD 1,928 ft.

Kings County: Tide Water Associated Oil Co. 1-35 California Pacific. Title Ins., 35-24s-22e. Dry. TD 5,000 ft.

Los Angeles County: H. P. Oates et al 1 Well, 26-5n-16w. Dry. TD 969 ft.

Union Oil Co. 8-B-1 Sansinena, NE NE 33-2s-10w, IPF 443 BPD, cut 14 per cent, 48/64-in. bean, 27° gravity, perforations 5,077-5,315 ft. in Miocene sand, TD 5,618 ft. (About ½-mile east extension to Sansinena field.)

Monterey County: General Petroleum Corp. 67X-30 Garrissere, 30-22s-10e. Dry. TD 3,367 ft.

San Luis Obispo County: Havenstrite Oil Co. 1 Havenstrite-Cleary, 8-25s-14e. Dry. TD 5,220 ft.

Santa Barbara County: Adobe Hill Co. 1 Adobe, 16-4n-26w. Dry. TD 4,360 ft.

Solano County: Wa-Me-Co Drilling Co. 1 Tavalero, 17-5n-1w. Dry. TD 982 ft.
Tulare County: Cole Oil Co. 1 Coke-Baker, 30-22s-28e. Dry. TD 369 ft.
Ventura County: Richfield Oil Corp. 6 West, 14-4n-21w. Dry. TD 6,199 ft.
Union Oil Co. 22 Simi Core Hole, 18-3n-17w. Dry. TD 989 ft.

MONTANA

Carbon County: Bridger Area: McAlester Fuel Co. 1 Government, SW NE NW 1-6s-22e. Dry. TD 4,898 ft. Amsden 4,870 ft.
Webster: Carter Oil Co. 1 Traweek, C NE NE 6-2n-61e. Dry. TD 10,143 ft. Second Cambrian sand 10,112 ft.
Chouteau County: Utah Southern 3 Maxwell, SE SW SE 21-27n-13e. Dry. TD 3,770 ft. Madison 3,188 ft.
Treasure County: United Petroleum & Mining 1 Moncana, C SW SE 26-8n-34e. Dry. TD 5,200 ft. Amsden (?) 5,140 ft.

WYOMING

Big Horn County, Hyattville: Superior Oil Co. 1-34 West Hyattville Unit-Government, CW½ NW 34-50n-90w. Dry. TD 2,286 ft. Tensleep 2,228 ft.
Socony-Vacuum Pegasus Division F-21-4-G, C NE NW 4-50n-91w. Dry. TD 3,389 ft., Phos-Dolo. 3,333 ft.
South Torchlight: South Torchlight Synd. Pond Petroleum 1 Government, SE SW NE 30-51n-92w. Dry. TD 3,391 ft. Dropped from report until operation resumes. Shoshone 3,310 ft.
Carbon County, Little Medicine Bow: Trigood Oil Co. 1-A Baker, SW NW NE 26-21n-78w. IPF 350 BOPD. 2nd Sundance discovery—new field. 3rd Sundance 7,066 ft. TD 7,125 ft.
Fremont County, Ridge Trail: Barron Kidd 1 Government-Gallivan, NE SW NE 4-27n-94w. Dry. TD 4,065 ft. Base Mesaverde 2,100 ft.
S.E. Sand Draw: Sohio Petroleum 1 Unit, SE NW SE 36-32n-95w. IPF 407 BOPD. Tensleep discovery—new field. Tensleep 8,600 ft. TD 8,799 ft.
Hot Springs County, Brooks anticline: Canada Southern Oil, Inc. 1 Tribal, NW NE NE 6-8n-3e. Dry. TD 4,219 ft. Madison 3,938 ft.
Nowater Area: The Chicago Corp.-Republic Natural Gas Co. 1 Government, SE NE NW 4-42n-90w. Dry. TD 3,841 ft. Tensleep 3,822 ft.
Sublette County, Big Piney area: Continental Oil Co. 1 Government, Northern Pump, C NE NE 32-30n-113w. IP 44 M.c.f. per day. Almy discovery—new field. Hillard 4,640 ft. TD 4,935 ft. PB 3,655 ft.

COLORADO

Adams County: Sinclair Oil & Gas Co. 2 John J. Shea, NE NE SW 14-2s-57w. IP swabbed 240 BOPD. "D" sand discovery—new field. "J" sand 5,314 ft. TD 5,410 ft.
Las Animas County: East Garcia, Baker & Taylor Drilling Co. 1 Le Sage, C SE SE 2-33s-60w. Dry. TD 2,495 ft. Pre-Cambrian granite 2,463 ft.
Logan County: Ginther-Warren & Ginther 1 State, SW SE NW 8-7n-51w. Dry. TD 4,680 ft. Skull Creek 4,650 ft.
Morgan County, West Fork: Falcon Seaboard 1 Snodgrass, NW NE NW 20-1n-57w. IP estimated 8 million cubic feet gas per day with distillate. "J" sand discovery—new field. Dakota 5,780 ft. TD 5,810 ft.
Logan County: Deep Rock Oil Corp. State "C," NE SE NE 9-9n-48w. Dry. TD 4,301 ft. Skull Creek 4,239 ft.
Lee Swedlund 1 Sanders-McRoberts, NE NW 31-9n-52w. Dry. TD 4,886 ft. "J" 4,804 ft.
Douglas County, Core Hole Test: Shell Oil Co. 2 Palm, NE SW NE 1-10s-68w. Dry. TD 625 ft.
Shell Oil Co. 1 Palm, NE SW NE 1-10s-68w. Dry. TD 655 ft.
Weld County: La Gloria Corp. 1 Weld County Mineral Fee, S½ SE NE 25-10n-61w. Dry. TD 8,821 ft. Base Lyons 8,773 ft.

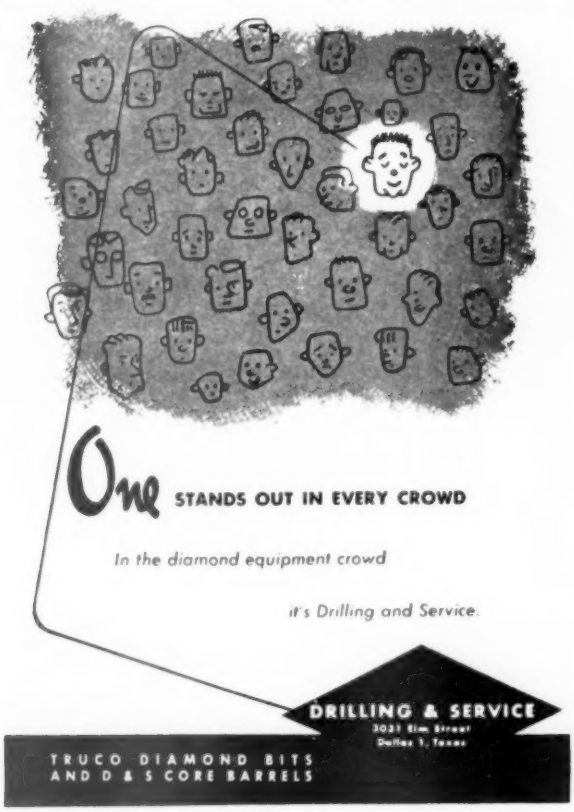
WILDCAT COMPLETIONS

NORTHERN NEW MEXICO

Rio Arriba County: El Paso Natural Gas Co. 2 San Juan Unit 28-4, SW NE SW 17-28n-4w. IP 872 M.c.f. per day, 3-hr. test. Mesaverde discovery—new field. Mancos 6,805 ft. TD 6,821 ft.
El Paso Natural Gas Co. 1 San Juan Unit 29-4, SW NE SW 30-29n-4w. IP 428 M.c.f. gas per day, 3-hr. test. Mesaverde discovery—new field. Pt. Lookout 6,587 ft. TD 6,775 ft.
Sandoval County: O. C. Shuck Drilling Co. 1 Cordova, SW NW NW 21-20n-1w. Dry. TD 1,166 ft. Pt. Lookout 1,002 ft.

SASKATCHEWAN

Socony-Central-Del Rio 1 Lake Alma, LSD 6, 10-3-17w2. Dry. TD 6,096 ft.
British American-Williston 1 Brightmore, LSD 9, 28-9-16w2. Dry. TD 4,128 ft.
Hudson's Bay-Tide Water 2 Chaplin Lake, LSD 4, 16-18-6w3. Dry. TD 3,755 ft.
Socony-Woodley-Southern 36-16 West Covington, LSD 16, 36-13-17w3. Dry. TD 4,049 ft.
Voss-Zena Developments, Ltd., 14-31 Debden, LSD 14, 31-53-5w2. Dry. TD 3,001 ft.
Canada Southern-New Superior et al 9-2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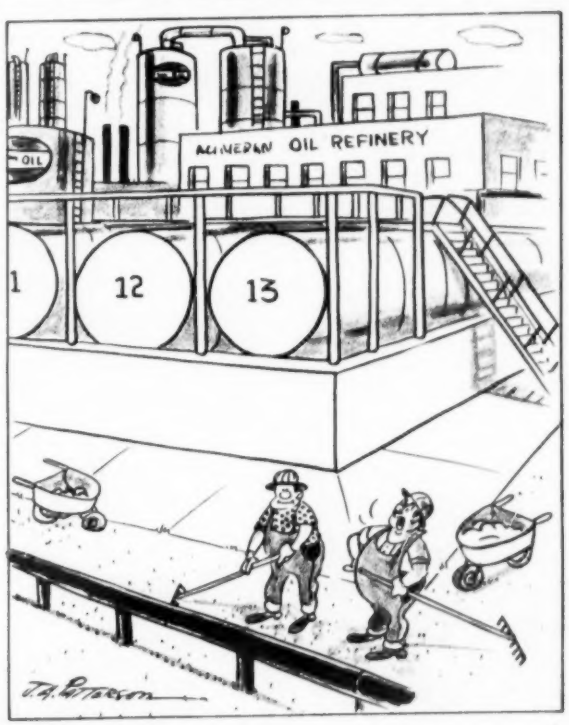

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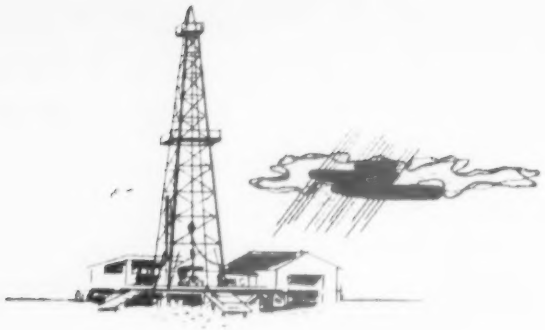

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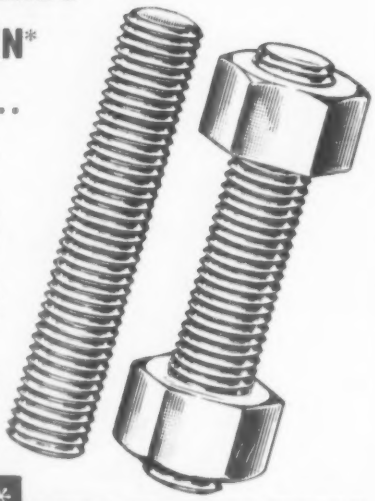

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WILDCAT COMPLETIONS

Ermine, LSD 9, 2-33-22w3. Dry. TD 2,988 ft.

Shell Oil Co. "A" 1-11 Dahinda, LSD 1, 11-9-23w2. Dry. TD 5,136 ft.

Tide Water-Rushville 1 Crown, LSD 9, 23-31-16w2. Dry. TD 2,401 ft.

ALBERTA

Amurex 1-14 Berry Creek, LSD 14, 13-24-13w4. Basal quartz oil well. TD 3,335 ft.

Oilwell Operators 14-18 Erskine, LSD 14, 18-39-20w4. Basal quartz sand gas well. TD 5,436 ft. PBTD 4,498 ft.

Socony-CPR 2 Entice, LSD 8, 30-28-23w4. Dry. TD 6,808 ft.

Commonwealth 1 Big Valley, LSD 4, 30-34-18w4. Dry. TD 6,077 ft.

Manalsab 1 Gold Star, LSD 6, 1-41-1w4. Dry. TD 2,363 ft.

Seaboard 9-18 West Leduc unit, LSD 9, 18-50-27w4. Dry. TD 6,850 ft.

Husky 1 Hazeldine, LSD 6, 11-52-4w4. Dry. TD 2,077 ft.

Stockton-Socony-CPR 2 Nacmine, LSD 8, 35-28-21w4. Dry. TD 6,066 ft.

Canadian Montana Gas Co. 6-30, LSD 6, 30-4-11w4. Dry. TD 2,555 ft.

Socony-Seaboard 33-7 Drayton Valley, LSD 7, 33-49-7w5. Dry. TD 6,390 ft.

Texaco A-1 Royce, LSD 4, 32-83-7w6. Dry. TD 3,795 ft.

Pacific-Gas Exploration 7 Rycroft, LSD 5, 35-77-4w6. Dry. TD 5,097 ft.

Hudson's Bay 1 Tide Lake, LSD 13, 9-17-10w4. Dry. TD 4,060 ft.

Texaco A-1 Wood River, LSD 9, 6-43-23w4. Basal quartz oil well. IP 14.8 BOPD. TD 5,914 ft.

NORTHWEST TERRITORIES

British American-Hudson's Bay 1 Jaen Marie, 61° 32′ N. Latitude, 120° 38′ 15″ W. Longtitude. Dry. TD 2,107 ft.

Mississippi Shows Found At Hodgeman Prospect

Good shows of oil in the Mississippi dolomite have been tested at I. W. Siegel, Henry Levitt, Harry Koplin and Tony Martin 1 Smalley, SE SE NE 9-23s-24w, Hodgeman County, Kansas, in the Hugoton embayment.

Recovery on a drill-stem test at 4,602-15 ft. was 420 ft. of gas, 120 ft. of heavily oil-cut mud, 370 ft. of free oil and 50 ft. of drilling water. Flow pressure was 250 psi., and bottom hole pressure was 1,375 psi. A test at 4,578-4,601 ft. recovered 90 ft. of slightly oil and gas-cut mud and 360 ft. of mud from the Mississippian. The wildcat is located 4 miles southwest of Jetmore pool and 4½ miles north of Purdyville pool in the central part of the county.

New Producer Assured At Southwest Navina

Macmillan Petroleum Corp. et al have what appears to be the sixth producer in new Southwest Navina pool, Logan County, Oklahoma.

The 1 Shields, as a result of a 2-hour drill-stem test, seems assured to be able to produce an estimated 200 bbl. of oil per day in the Simpson dolomite sand. The producing interval is at 6,430 to 6,514 ft., or 84 ft. of dolomite sand. This is indication

of the second dolomite production found in this field.

The 1 Shields is ½ miles southeast of the discovery well, 1 Krout, which was placed on production in February and initially flowed at the rate of 1,200 bbl. of oil per day on a 20/64-in. choke. Operators will drill ahead. In the same area the 1 Scheihing is drilling ahead at 6,487 ft. to the Wilcox sand.

Deep Well Scheduled In Calvert Field

Humble Oil & Refining Co. has scheduled an Edwards limestone test in the old Calvert field in western Robertson County, East Texas. The new venture, designated 27 P. C. Gibson in the James Webb Survey, will be carried to 5,000 ft. Regular pay in the area is from around 2,100 ft. Humble's first deep Edwards lime test in the field was drilled as 1 Garrett, which found Edwards limestone at 4,827 ft. but plugged back to complete in the regular pay.

In Wood County a wildcat has been scheduled by R. E. Smith, Houston, as 1 Eagle Ford Land & Industrial Co. Location is in the S. E. Gray Survey, A-251, 3 miles west of Golden and about the same distance south of Alba field. Contract depth was 7,500 ft.

Franklin County's new oil field north of Winnsboro will have a confirmation test drilled by Humble as 1 Mary L. Stanley, W. B. Jordan Survey, A-581. The new project will go to 8,600 ft. and is a south offset to Humble's 1 A. C. Ballard, 125-bbl. discovery in Rodessa pay.

Second Well Confirms Jeanerette Discovery

Kerr-McGee Oil Industries, Inc., of Oklahoma City, has confirmed its recent 6,900-ft. oil discovery east of Jeanerette field, in St. Mary Parish, Coastal Louisiana, with completion the past week of its second well in the immediate area.

The confirmation well, 2 Bessie, a location east of the initial well, both in 39-13s-9e, flowed at the rate of 253 bbl. of 33°-gravity oil per day through 10/64-in. choke with 750 psi. pressure on the tubing. Pay zone is open through casing perforations at 6,935-40 ft.

The initial well, 1 Bessie, flowed 187 bbl. of 30.3°-gravity oil daily through 9/64-in. choke with pipe perforated at 6,930-62 ft.

Seward County, Kansas, Well Has Oil Show

Seward County in southwestern Kansas reports a show in a wildcat in the central part of the county, 18 miles northwest of Liberal-Light pool on the east side of Hugoton gas field.

Cities Service Oil Co. 1 Holt "B," C NW NE 23-32s-34w, recovered 150 ft. of gas-cut mud and 30 ft. of oil and gas-cut mud on drill-stem test at 6,127-74 ft.

McClain County Field Confirmed in Oklahoma

Magnolia Petroleum Co. 1 Lawson Bull unit, NE NE 8-5n-2w, McClain County, in south-central Oklahoma, flowed 41 bbl. of 40°-gravity oil in 35 minutes to assure confirmation to new West Sealy pool. The drill-stem test was taken at 8,392-8,442 ft. The field's discovery well was Magnolia 1 Love, SW SW 4-5n-2w. The discovery well was finaled on flow of 325 bbl. of oil per day on ¼-in. tubing choke from the first Bromide sand at 8,317-25 and 8,337-77 ft. The Lawson Bull unit, second well in the field, also flowed in the first Bromide.

Bartlesville Pay Tested At Cleveland County Test

British-American Oil Producing Co. is drilling ahead below 8,133 ft. in sand after running a drill-stem test in the Bartlesville sand at 1 Reinauer Price, C SE NW 17-9n-3w, Cleveland County, Oklahoma. Recovery on the test at 8,069-92 ft. was 200 ft. of free 40°-gravity oil, the 1,000-ft. water cushion, and 100 ft. of heavily oil and gas-cut mud. Production in Northwest Norman pool is from the Viola lime and Wilcox sands.

Among the Drilling Contractors

Conroe Drilling Co., Corpus Christi, is under contract to Renwar Oil Corp. for a 7,500-ft. wildcat test to be drilled at 2 Maryland Trust, 4 miles northwest of Aransas Pass, in San Patricio County, Texas Gulf Coast.

Wixson Drilling Co. is drilling on a contract with Rupp-Ferguson Oil Co. at a wildcat location 3 miles northwest of Augusta North pool, in Butler County, southeastern Kansas. The test,

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Other patents pending

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VIKING PUMP COMPANY CEDAR FALLS, IOWA

I Classen, is spotted in the NE NE NE 31-26s-4e.

Southwest Workover, Inc., has a contract with Pan American Production Co. for a 5,500-ft. test, 2 Brown, to be drilled at a wildcat location 2 miles southeast of Mathis, San Patricio County, Texas Gulf Coast.

Guffey Brothers have contracted for an 8,000-ft. test to be drilled for Jake L. Hamon and Edwin L. Cox at 1-A Thigpen, a wildcat located in the Luz Navarette Survey, 2 miles east of Choate, in Karnes County, Texas. Location, east of the Burnell field, is near the Goliad County line.

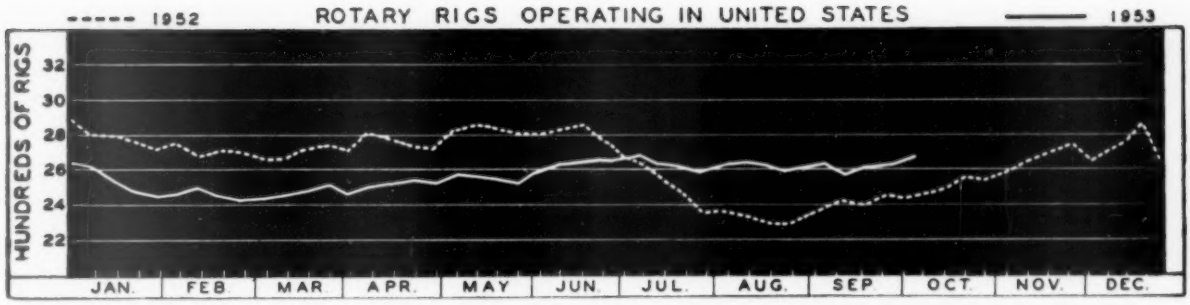
Delta Gulf Drilling Co., Tyler, Tex., has contracted with Shell Oil Co. for two Coastal Louisiana deep tests, one to be drilled in the Iowa area, Calcasieu Parish, and the other in the Lake Arthur area, Jefferson Davis Parish. It also has two other new Louisiana contract jobs under way, one in the Melville area, St. Landry Parish, for McDermott & Barnhart, of Houston, and the other in the East Hackberry area, Cameron Parish, for Gulf Refining Co.

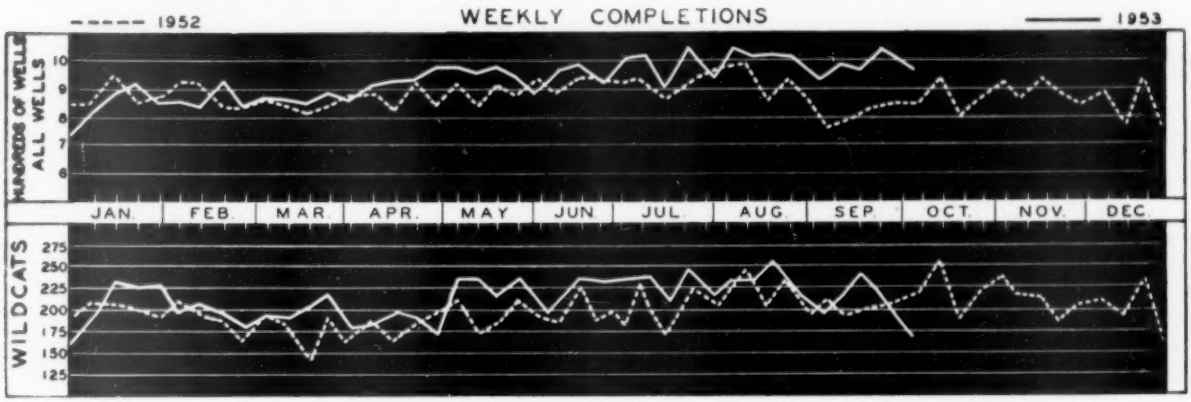
Appell Drilling Co. is moving a rig to a wildcat location 6 miles south of Falls City, Karnes County, South Texas, where it will drill a 5,000-ft. Wilcox test for its affiliate, Appell Oil & Gas Corp. The test, 1 Ed Franklin estate, in the Don Erasmo Seguin Grant, is about 1½ miles south of the Hobson field.

Mobile Drilling & Well Service Co. has contracted for a 5,700-ft. test to be drilled for W. R. Godsey, of Houston, in the Indian Hills area of northern Harris County, Texas Gulf Coast. The test, 1 Mahaffey, is a semiwildcat, being approximately 1,800 ft. southwest of the area's discovery well, Federal Royalty Co. 1 Schweinle, completed last April in Cockfield pay at 5,539-41 ft.

Rhodes Drilling Co. is under contract for a 5,000-ft. test to be drilled in Jim Hogg County, in the Rio Grande Valley area of South Texas, for Chizum, Rhodes & Hicks. Location is for 2 Izaguirre, in the Agua Nueva de Abajo Survey, 30 miles north of Rio Grande City. Rig for the test is being moved in from a wildcat test the contractor has just completed in Bee County.

Pike Drilling Co., Los Angeles, has a new wildcat test under way for Oceanic Oil Co. in the Bitterwater area of San Benito County, California. The operation, designated as 1 Maggini, is located in 10-18s-9e, about 2 miles southeast of production.





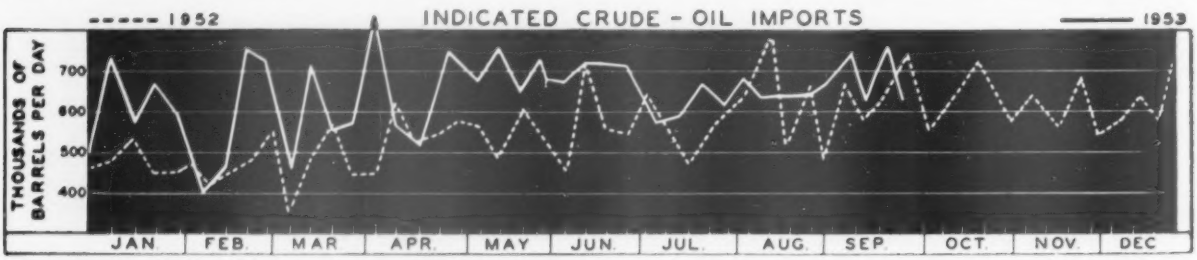
CURRENT STATISTICS

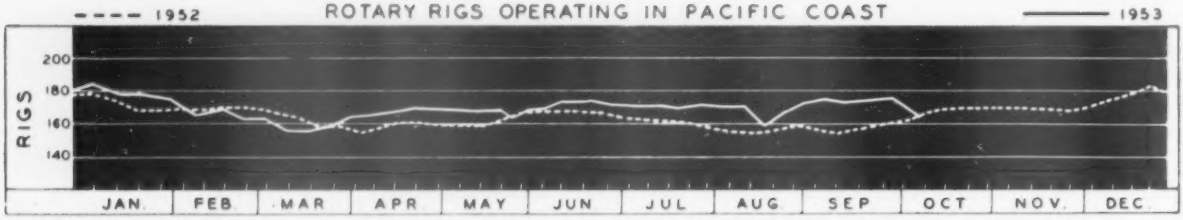
EXPLORATION

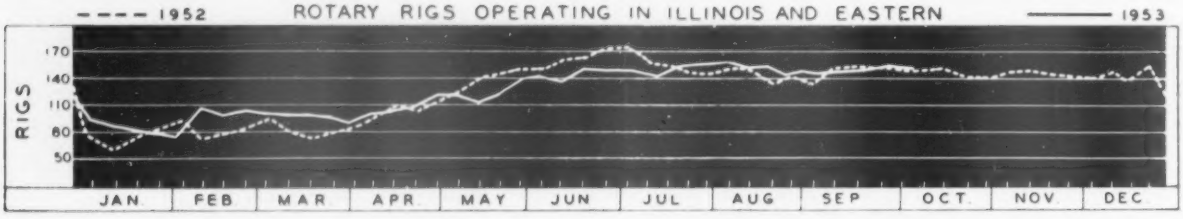
WEEKLY WELL COMPLETIONS . . . WEEK ENDED OCTOBER 3, 1953

	Total of all wells					Oct. 3		Wildcat completions and discoveries					Cumulative total, 1953				
	Comp.	Oil	Gas	Dry	Footage	1953	1952	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	17	8	0	*9	24,600	571	616	0	0	0	0	0	0	0	0	0	0
Pennsylvania	45	20	4	†21	90,200	1,429	1,519	0	0	0	0	0	0	0	3	11	14
West Virginia	16	4	9	3	37,916	475	447	0	0	0	0	0	0	0	9	4	13
Ohio	25	13	3	‡9	52,177	799	781	0	0	0	0	0	2	0	3	13	18
Indiana	19	7	0	12	29,155	984	961	0	0	0	8	8	11	0	2	270	283
Kentucky	27	15	2	10	44,644	851	979	0	0	0	5	5	8	0	1	146	155
Illinois	37	17	0	20	81,315	1,470	1,546	0	0	0	7	7	5	0	0	309	314
Michigan	14	5	1	8	41,889	452	528	0	0	0	8	8	12	0	5	186	203
Kansas	94	42	9	‡43	313,703	3,671	3,489	0	0	0	10	10	74	0	30	575	679
Nebraska	4	3	0	1	‡3,382	252	216	0	0	0	1	1	14	0	4	107	125
Oklahoma	164	105	6	§53	561,667	5,603	4,344	2	0	0	4	6	96	6	26	474	602
Texas	282	170	10	102	1,235,406	12,906	13,416	10	0	1	53	64	673	45	137	3,163	4,018
North Central (Dist. 7-B & 9)	115	66	2	47	385,668	4,866	4,291	6	0	1	18	25	351	0	16	1,272	1,639
West (Dist. 7-C & 8)	76	53	1	22	407,502	2,821	4,098	3	0	0	13	16	141	2	12	510	665
Panhandle (Dist. 10)	18	16	0	2	59,846	598	521	0	0	0	0	0	0	2	0	15	17
Eastern (Dist. 5 & 6)	12	3	3	6	76,945	593	623	0	0	0	4	4	17	2	5	209	233
Gulf Coast (Dist. 2 & 3)	37	16	3	18	230,857	1,903	2,036	0	0	0	12	12	85	18	55	503	661
Southwest (Dist. 1 & 4)	24	16	1	7	74,588	2,125	1,847	1	0	0	6	7	79	21	49	654	803
Louisiana	56	34	5	17	390,334	1,983	1,732	5	1	1	6	13	64	28	18	274	384
Northern	26	13	2	11	111,699	828	930	1	0	0	5	6	8	2	2	109	121
Southern	30	21	3	6	278,635	1,155	802	4	1	1	1	7	56	26	16	165	263
Arkansas	12	6	0	6	49,193	404	295	0	0	0	1	1	11	0	0	89	100
Mississippi	6	3	0	3	37,223	274	272	0	0	0	1	1	12	1	4	126	143
Southeastern States	5	0	0	5	14,012	112	51	0	0	0	4	4	1	0	0	92	93
Montana	17	9	0	8	71,656	320	223	0	0	0	4	4	12	0	0	79	91
Wyoming	21	12	1	8	111,077	559	496	2	0	1	6	9	20	0	2	102	124
Colorado	17	5	2	10	86,323	521	325	1	0	1	7	9	23	0	10	231	264
Utah	0	0	0	0	0	50	61	0	0	0	0	0	2	0	4	28	34
New Mexico	32	12	14	6	180,461	1,050	784	0	0	2	2	4	16	1	13	94	124
California	46	25	0	21	186,911	1,924	1,840	1	0	0	15	16	48	0	8	436	492
North Dakota	7	4	0	3	54,173	195	73	0	0	0	2	2	7	0	0	49	56
Miscellaneous (Mo.)	6	2	0	4	9,852	63	88	0	0	0	1	1	1	0	3	38	42
Total United States	969	521	66	382	3,727,269	36,918	35,082	21	1	6	142	170	1,112	81	282	6,896	8,371
Total previous week	1,045	549	90	406	4,097,145			33	4	3	181	221	1,091	80	276	6,754	8,201
Total October 4, 1952	845	416	55	374	3,413,861			29	1	6	183	219	1,061	67	192	6,484	7,804

Service wells included: *9, †16, ‡2, §1.





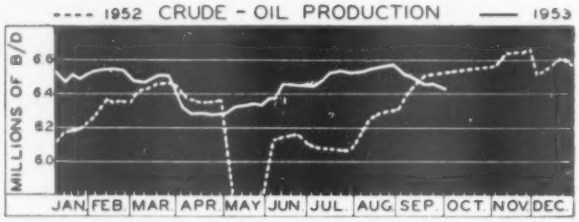


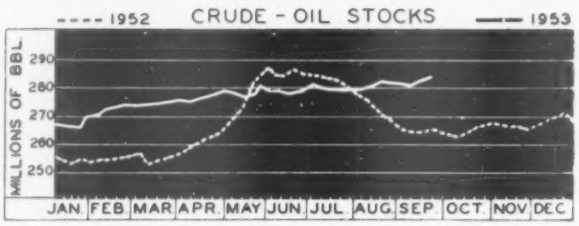
DAILY AVERAGE PRODUCTION FOR WEEK

	October 3			Sept. 26 total
	Crude oil	Lease condensate	Total	
Alabama	5,100		5,100	5,200
Arkansas	77,800	450	78,250	78,700
California	1,003,400		1,003,400	1,002,100
Colorado	111,000		111,000	117,500
Eastern	60,000		60,000	59,200
Florida	1,550		1,550	1,525
Illinois	169,600		169,600	165,200
Indiana	33,700		33,700	34,300
Kansas	306,300		306,300	327,300
Kentucky	31,500		31,500	31,700
Louisiana	658,150	40,400	698,550	701,125
North	106,700	2,900	109,600	108,600
South	551,450	37,500	588,950	592,525
Michigan	32,200		32,200	32,300
Mississippi	91,750	3,250	95,000	96,250
Montana	32,000		32,000	31,400
Nebraska	14,700		14,700	14,900
New Mexico	202,125	550	202,675	201,200
Oklahoma	540,200		540,200	544,800
Texas	2,719,850	46,200	2,766,050	2,781,150
Dist. 1	39,150	350	39,500	39,925
Dist. 2	147,850	5,100	152,950	155,000
Dist. 3	440,250	24,150	464,400	467,300
Dist. 4	256,450	5,700	262,150	263,700
Dist. 5	47,925	400	48,325	48,650
Dist. 6	125,225	5,000	130,225	131,875
East Texas field	248,775		248,775	252,000
Dist. 7-B	117,225	50	117,275	116,725
Dist. 7-C	162,075	4,150	166,225	165,400
Dist. 8	872,625	900	873,525	876,650
Dist. 9	187,150	350	187,500	188,875
Dist. 10	75,150	50	75,200	75,050
Utah	5,000		5,000	5,200
Wyoming	211,000		211,000	214,100
North Dakota	14,100		14,100	13,700
Total U. S.	6,321,025	90,850	6,411,875	6,458,850
Change from previous week			down 46,975	
Canada	246,350		246,350	295,425

Total U. S. production January 1-October 3 1,781,558,700 bbl.
Same period last year (crude plus cond.) *1,709,199,025 bbl.

*Includes 23,647,260 bbl. condensate.





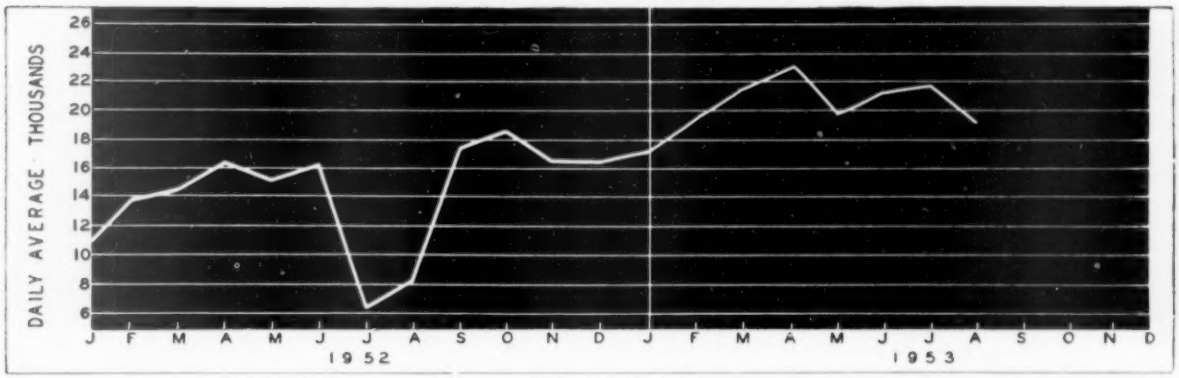
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

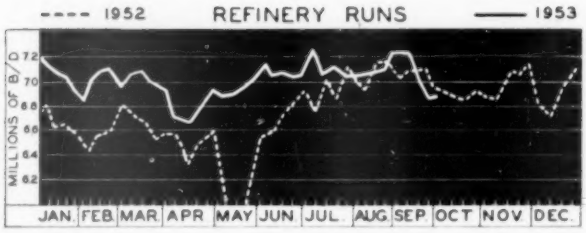
(Thousands of barrels)

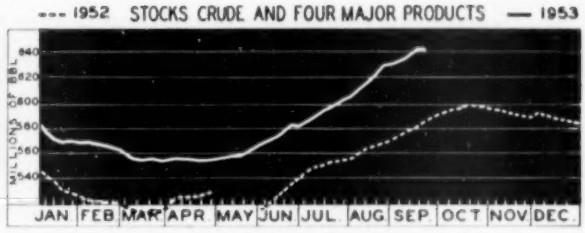
	Sept. 26, '53	Sept. 19, '53	Sept. 27, '52
Pennsylvania Grade	2,771	2,729	2,208
Other Appalachian	2,119	2,256	2,285
Illinois, Indiana, Michigan	12,222	12,140	12,031
Arkansas	3,029	3,057	3,031
Louisiana	16,849	16,768	16,319
North	2,659	2,731	2,324
Gulf	14,190	14,037	13,995
Mississippi	3,712	3,686	3,462
New Mexico	9,875	9,638	7,468
Oklahoma and Kansas	41,853	41,644	38,288
Texas	133,196	131,265	128,254
East Texas	11,839	11,030	13,371
West Texas	59,040	59,490	57,863
Texas Gulf	28,568	28,008	26,611
Other Texas	33,749	32,737	30,409
Rocky Mountain	16,612	16,821	14,423
California	32,699	‡32,963	30,767
Foreign	†9,728	‡10,448	7,365
Total	284,665	‡283,415	265,901

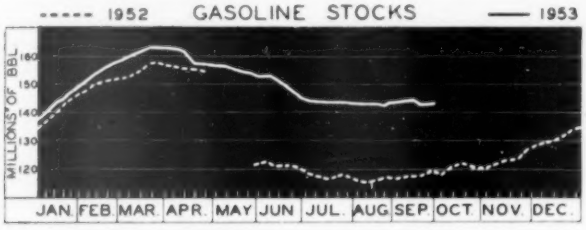
*Bureau of Mines. †Incl. 3,253,000 bbl. in California. ‡Revised.

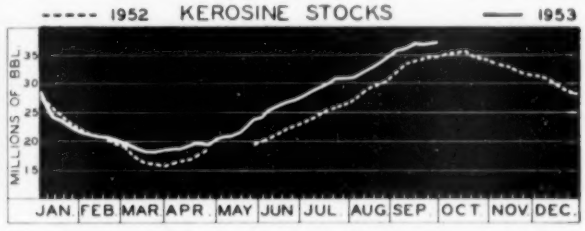
MOTOR-VEHICLE SALES (DOMESTIC MARKET)

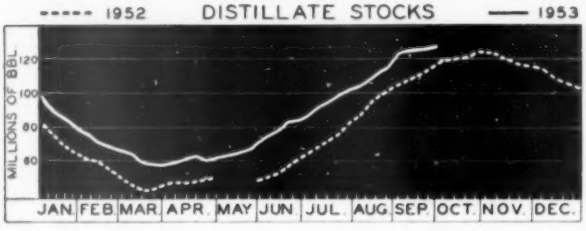


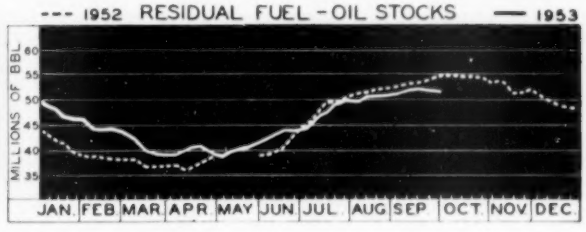










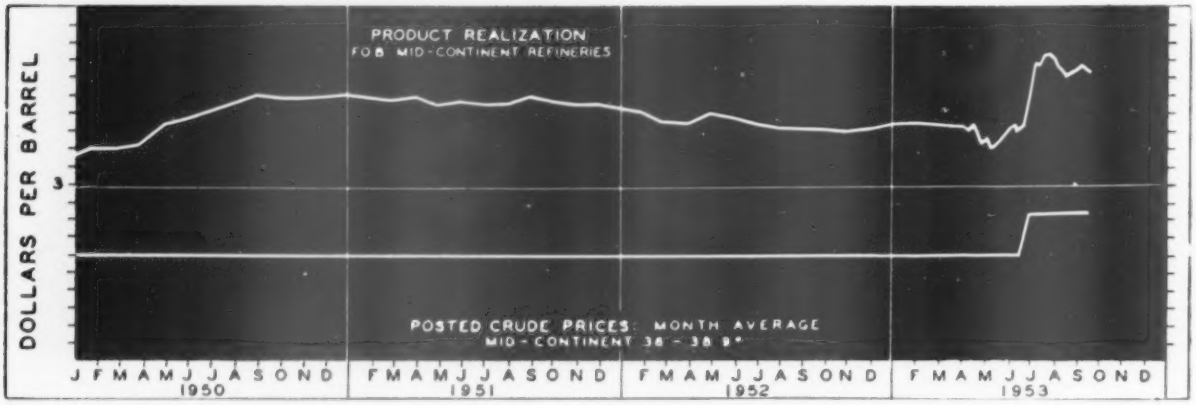


A.P.I. REFINERY REPORT, OCTOBER 3

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, October 1952 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,050	428.3	32.6	296.6	214.0	33,571	14,636	45,169	13,299	1,045	422.7	44.7	254.9	219.6
Appalachian:														
District 1	122	48.1	5.4	22.3	13.7	3,844	591	1,580	686	97	40.8	5.9	17.2	13.9
District 2	76	44.3	3.6	9.0	9.9	1,663	664	642	150	87	40.7	6.7	13.1	13.9
Ind., Ill., Ky.	1,255	693.7	83.8	227.4	159.6	27,559	9,355	22,780	4,604	1,244	674.6	73.6	220.5	159.0
Okla., Kans., Mo.	543	320.7	15.0	125.7	44.1	14,770	2,668	12,927	1,078	565	324.9	11.4	136.6	58.0
Inland Texas	237	175.7	10.8	50.9	30.0	5,642	650	2,376	1,471	265	180.0	12.8	41.4	36.9
Texas Gulf Coast	1,720	831.6	122.7	392.0	233.8	19,885	4,356	15,921	7,235	1,746	780.6	117.5	405.3	286.6
La. Gulf Coast	492	258.7	61.6	121.7	29.6	8,021	2,777	7,277	1,358	525	269.2	61.1	131.0	54.8
N. La. and Ark.	86	38.0	6.9	15.3	6.4	3,060	769	726	105	85	34.4	7.6	21.5	7.0
Rocky Mountain:														
New Mexico	19	12.4		3.0	3.7	145		38	28	18	11.2	.7	2.9	4.1
Other Rocky Mtn.	251	123.3	4.9	59.0	45.0	4,597	311	2,875	1,043	205	99.2	5.1	39.4	39.6
California	1,042	460.2	17.4	150.3	388.6	20,465	483	14,741	20,855	1,001	422.5	5.1	173.7	328.5
Oct. 3, 1953	6,893	3,435.0	364.7	1,473.2	1,178.4	143,222	37,260	127,052	51,912	6,883	3,300.8	352.2	1,457.5	1,203.9
Sept. 26, 1953	6,880	3,416.6	337.4	1,393.9	1,151.7	142,484	36,924	126,217	51,936					
Oct. 4, 1952	6,928	3,350.1	370.7	1,489.0	1,280.9	119,793	35,212	118,078	54,617					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952
F M A M J J A S O N D
1953

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.63 for week ended September 26, $3.65 for previous week, and $3.32 for September 1952. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of October 7, 1953. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	11.125-11.625	13-13.8	11.125-11.75
Premium gasoline	12.25-12.875	14.5-14.8	12.25-12.75
42-44 w.w. kerosine	8.875-9.25	10.15-10.4	9-9.5
No. 2 straw fuel oil	7.875-8.25	9.15-9.4	8-8.5
No. 6 residual	$1.20-1.30	$2.15-2.40	$1.85-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	6.375	5.875	6.125
Grade 18-55	7.65	7.15	7.40

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13.75
750 vis., No. 3-4 neutral	16.75
2,000 No. 5-6 neutral	18-18.75

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	20.5-21.5
200 vis, No. 3 neutral, 0-10 pp.	14.5

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	25.5
180 vis., 10 p.t. neutral	27.5

WAX

Mid-Continent

132-134 A.M.P.	6.0

THE expected rush by consumers and secondary suppliers to fill distillate tanks on the East Coast before the termination of the discount period at the end of September failed to materialize.

Most major suppliers withdrew the discount of 0.5 cent a gallon at the end of the month, but soft markets have prevented full return to prices in effect before the summer discount. Actual posted prices for barge delivery of No. 2 fuel in New York Harbor range up to 9.9 cents a gallon. However, some distress material is reported to be available at prices slightly less than the generally accepted low of 9.15 cents that existed during the discount period.

Just before the crude-price increase in June, No. 2 distillate was available in New York Harbor as low as 9 cents a gallon, but top postings were up to 9.65 cents. After the increase in crude prices, top postings moved up to 10.15 cents for No. 2, but by the first week of July a reduction of 0.35 cent was announced, bringing the highest quotation down to 9.9 cents. Some suppliers continued a price of 9.65 cents which later was reduced to 9.15 cents by the summer discount of 0.5 cent a gallon.

Some suppliers are wondering how much cold weather it will take to strengthen the market enough to sustain a spot price of 9.65 cents.

Residual-fuel prices in the Group 3 area are slightly higher. Spot material, moving to consumers, is reported to be selling at $1.20 a barrel for high-sulfur fuel. Resellers are having to pay as much as $1.15.

Excessive stocks of gasoline at Gulf Coast and East Coast terminals are showing up as soft gasoline markets on the Gulf Coast. Slightly lower prices are reported for low-octane regular grades. All grades are readily available.

CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.*	Oklahoma, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87			
15-15.9	1.93			
16-16.9	1.99			
17-17.9	2.05			
18-18.9	2.11			
19-19.9	2.18			
20-20.9	2.24	$2.50		$2.37
21-21.9	2.30	2.52		2.39
22-22.9	2.37	2.54		2.41
23-23.9	2.45	2.56		2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9		2.76	3.09	2.63
34-34.9		2.78	3.11	2.65
35-35.9		2.80	3.13	2.67
36-36.9		2.82	3.15	2.69
37-37.9		2.84	3.17	2.71
38-38.9		2.86	3.19	2.73
39-39.9		2.88	3.21	2.75
40 and above		2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Includes New Mexico Permian.

Prices East of California effective June 15, 1953. California prices effective February 16, 1953. Pennsylvania Grade prices effective September 21, 1953.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	4.05
Southwest Pennsylvania	3.61
West Virginia	3.55
Ohio	3.54
Illinois Basin	3.02

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MODEL E563-42 Cooper well service unit, servicing to 6000 ft., skid mounted, 8x10x60' mast, excellent condition, $4,500.00. The Zeligson Company, Tulsa, Oklahoma 8-4477 P.O. Box 5008.

FOR SALE at Okla. City whse., 1 used 8" x 3¼" x 8" Ingersoll-Rand type 20 high pressure, 2 stage portable compressor, Serial #PP71898 driven by model GU2S 5¾" x 6¼" Waukesha engine Serial #76426 mounted on steel wheels. Price $1500.00. Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

OIL FIELD EQUIPMENT
18,000 ft., 4½-in. casing, 11 lb., 85 cents; 25,000 ft., 2-in. tubing, 24 cents; 1,100 ft., 7-in. casing, $1.25; 25,000 ft., ⅝-in. rods, 12½ cents. 6D Jensen jack, $450. Bethlehem jack, $675. National jack, $500. Oilwell jack, $550. 5 hp. motors and controls, $175 ea. Miscellaneous fittings, 2-in. lead line; 100, 250, and 312-bbl. tanks. All equipment nearly new. Floyd Hubbard, Virgil, Kansas.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units, Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132 Rockdale, Texas
AT-3427—Houston, Texas

Equipment Values!

D8 TRACTOR—Caterpillar Diesel, Ser. #2U1348, equipped with La Plant Choate angledozer and Caterpillar #25 CCU. Have completely reworked the idlers and rollers—entire track group is 80% new. Has 20" shoes, crankcase guard, front pull hook. A bargain price in a good sound tractor. F.O.B. Louisville, Ky. **$9,250.00**

D337 ENGINE—Caterpillar Diesel, Ser. #22B165. Develops 223 HP at 2000 RPM with full equipment. This is the "X" arrangement and includes an enclosed type clutch, steel channel base, engine mounted controls, radiator, fuel tank, safety shutoff device, blower and tachometer. Has had complete factory remodification, which consisted of main and rod bearings, new pistons and new head. Actual use does not exceed 500 hours. F.O.B. Paducah, Ky. **$4,600.00**

COMPRESSOR—Gardner-Denver 500 Cu. Ft., Ser. #154230. This all water-cooled compressor is powered by Caterpillar Diesel D13000 Engine. Mounted on 4—750 x 20 pneu. tires. This machine was placed in our rental stock in 1951. Has been used 3859 hours. Delivers new for $12,945.00. Priced for quick sale! F.O.B. Ashland, Ky. **$7,750.00**

ROY C.
WHAYNE
SUPPLY CO.
800 W. MAIN ST., LOUISVILLE, KY.
EVANSVILLE, IND. PADUCAH, KY. ASHLAND, KY.

EQUIPMENT FOR SALE

WILSON Giant Drawworks equipped make and break cathead. 2 P.C. 1879 Buda Engines. All this equipment in A-1 condition. Priced right to sell. Box G-711, The Oil and Gas Journal, Tulsa, Oklahoma.

2—Model 19 ELI 24 trace seismograph instruments, with ELI RO-10 Camera, mounted on 1½-ton Ford truck with twin power reels and cables. In operating condition. Priced to sell, only $5,000.00 each. Dayton Exploration Company, 600 East 4th, Tulsa, Oklahoma. Phone 3-6845.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

FOR SALE

New and Used material—Immediate delivery from stock, Angles, Channels, I and WF Beams, especially for construction needs.

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Phone or Wire your steel requirements.

We are also interested in purchasing your surplus material. We assure you our prices will be the best obtainable.

CARSAND STEEL CORP.
14-23 34th Avenue
Astoria, New York
Astoria 8-4484 8-8023

BARON TUBE CO.
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ATLANTA, GA.

A SURE SOURCE OF SUPPLY AT ALL MARKET LEVELS FOR CASING, TUBING AND LINE PIPE. INQUIRIES SOLICITED.

EQUIPMENT FOR SALE

7—8000 GAL. R.R. TANK CAR tanks with heating coils in New Jersey $685 each. Lestan Corp., Rosemont, Pa.

FOR SALE: 10,000'—4½" drill pipe, with tool joints cut off, located at Hobbs, New Mexico. Makin Drilling Company, Box 1628, Hobbs, New Mexico.

FOR SALE

Equipment for Complete Pipe Shop

1—Bignall & Keeler 6 B Threading Machine. Landis Heads 1¼" to 6".

1—Bignall & Keeler #12 Threading Machine. 4" to 14".

1—McFarland Portable Pipe Testing Machine Mounted on Tandem Wheel Trailer.

1—Ingersoll-Rand 3 Cylinder Air Compressor W/15 HP Motor.

1—Master Deluxe Pipe Cleaning Machine W/Wisconsin Engine.

1—Model D-8 Hydraulic Pipe Straightener—100 Ton—W/Wisconsin Engine.

1—Malsbury Automatic Steam Cleaner, Portable.

1—G E Electric Welder W/25 AP Acetylene Generator and HOM #1 Beveling Machine (4" to 6") and HOM #2 Beveling Machine (8" to 12"). All Mounted on 2 Wheel Trailer.

Complete set of motors, cutters, hose, etc., for cleaning inside of 1" to 6⅝" ID Pipe.

1—#502 Oster Pipe Threading Machine W/¼" to 2" Dies.

Tool Cabinets, Chain Hoists & Trolleys.

This Equipment Purchased New. Used Less Than 1 Yr.

40% OFF NEW COST

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Shreveport, Louisiana
P. O. Box 592 Phone 4-2601

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One with steel Cone Roof, 114'-6" diameter by 30' high. Riveted construction. Located Centralia, Mo.

One with Steel Floating Roof, 114'-6" diameter by 32'-6" high. Riveted construction. Located Wellsville, Mo.

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WATER FLOOD EQUIPMENT for Sale in East Kansas; One 100 H.P. Waukesha engine, $500.00; One 40 H.P. Bovaird-Seyfang gas engine with cutoff coupling clutch, $350.00; Two 3 x 8 Worthington pumps, $200.00 each. For further information contact D. K. Auld, Deep Rock Oil Corporation, Garnett, Kansas, or Joe A. Huitt, Tulsa.

FOR SALE: At Oklahoma City 2700′ 9″ OD 40# used J-55 Seamless Steel Casing, 8-V thread ST&C, $3.00 per foot. Also 3500′ 9″ OD 46.10# LT&C. Ditto $3.60 per foot. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

SULLIVAN 200, trailer mounted, complete with all tools, contact for inventory and price. Mesker Drilling Company, Box 6157, Tulsa. Phone 5-9357.

FOR SALE—ELI Model M-6 portable drilling rig on GMC Truck. Ideal for water wells. Will consider good spudder as trade. Vaughn & Taylor Construction Co., Inc., 2103 North Grant, Odessa, Texas. Phone 7-2091.

REFINERY AND GASOLINE PLANT EQUIPMENT

11—Griscom-Russell 21-6-144, Style FST Gas Coolers, single pass shell, two pass tubes, 250# WP.
2—Same as above, only 500# WP.
6—Coynco T-144 Atmospheric Cooling Sections, 750 sq. ft. each, 125# WP.
3—Vertical Gas Scrubbers (1) 250# WP, (2) 500# WP.
1—7′ 6″ x 72′ x 1¼″, no trays, tower.
2—Goulds Centrifugal Pumps, 2500 GPM, 25′ Head, direct connected to 15 HP Explosionproof Electric Motors, 1750 RPM.
50—Compressor Cylinders all sizes for Clark Bros., Cooper-Bessemer, Ingersoll-Rand, and Worthington Gas Engine Compressors.

C. J. SMITH
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STEEL PIPE
.335 and .375 wall
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Special Sacrifice Price
For use as culverts, conduit or water lines
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EQUIPMENT FOR SALE

FOR SALE: 4598 feet of 7⅝ inch O. D. Pipe, 26.4 lb., 8 thread, J-55 B Grade, run once, located at Roundup, Montana. Box G-717, The Oil and Gas Journal, Tulsa, Oklahoma.

FAILING MODEL 1500—on contract with major client in Montana. Write for details to Box G-703, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 1 Montgomery 3 axle lowboy with International Tractor. Contact Mr. Wm. Bingman, P.O. Box 281 — Telephone 5877, Carmi, Illinois.

NEW 145GKU Waukesha Engine used less than 90 days. Perfect condition. Delivered cost $3,500.00, sell for $2,850.00. Reed Drilling Co., Inc., Philtower Bldg., Tulsa, Okla. Phone 2-9638.

HIGH-PRESSURE gas separator, 6,000 ft. 3-in. pipe, 2,000 ft. 2-in. tubing, 2,000 ft. 8-in. casing. W. E. Griffith, 1225 E. 27th Place, Tulsa. Phone 72-2552.

EVERYTHING in new and used equipment for well drilling. Fishing tools rented. Save money, get quotations from Pressey & Son, Pueblo, Colorado.

FOR SALE—5000′ of 4½″ OD drill pipe with Hughes tool joints. Good condition for medium drilling. Located near Abilene, Tex. Subject to inspection. WELSH, 609 Gulf States Bldg., Dallas, Tex. PR-5668.

FOR SALE: 5—Shriver 42″x42″ cast iron Filter Presses, Plate & Frame Type, 27, and 54 chambers 1″ cake; 15—Sperry 18″x18″ cast iron Filter Presses, 11 chambers; #12 Sweetland Filter for 72 monel covered leaves on 2″ centers. Immediate shipment. Attractively priced. Consolidated Products Co., Inc., 17-20 Park Row, New York 38, N. Y. BArclay 7-0600.

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One Each (4¾″ to 1″) (8⅝″ to 23⅛″) (13⅛″ to 41½″) LANDIS Leadscrew Receding Head Pipe Threading and Cutting Machine Motor Driven.
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600′—18″ O.D., ⅜″ Wall. Like new.
10,000′—7″ O.D. Good Used Casing, 20# Lap.
50,000′—4½″ O.D. Line Pipe, A-1, 10.89# ALSO
8,000′—3½″, 10,000′—2¼″, and 10,000′—2″ O.D. Number one used, seamless, beveled for welding. Ideal for oil, gas, or water lines.
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Complete Rotary Rig Equipped W/Wilson Giant Single Engine Draw Works, GM Twin-Diesel Engines, 7 X 12 8000 Series Wheeland Mud Pump, 96′ Lee C. Moore Cantilever Mast, 8′ X 24′ American Steel Doghouse, 5000′ of 3½″ Drill Pipe W/Hughes Flash Weld Tool Jts.; 7⅝″ Model EW American Overshot complete W/Slips and complete with miscellaneous Tools.
MORRISON DRILLING COMPANY, INC.
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WANTED, USED EQUIPMENT, one oil well cementing pump with or without truck. Write W. L. Blakely, Jelloway Place, Danville, Ohio.

NOTICE: We buy. We sell equipment everywhere. If you want to sell or buy contact Pressey & Son, Pueblo, Colorado.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Greer Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

EQUIPMENT WANTED

WILL TRADE at Aspermont, Texas, 25,000′ or less of 2⅞″ upset J-55 seamless tubing for 2⅜″. Joe A. Huitt, Deep Rock Oil Corp., Tulsa.

WANTED soon used natural gasoline plant to extract natural gasoline, butane and propane to handle 4 to 8 million C.F. daily wet gas. Goodalls, Ogallala, Nebr.

INTERESTED in any amount 2⅞ double pin Hydril pipe. Must be in good condition. Box G-724, The Oil and Gas Journal, Tulsa, Oklahoma.

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PETROLEUM ENGINEERS

FOREIGN SERVICE

Graduate engineers with good background in general physics, mathematics, mechanics and with some laboratory experience in equipment and techniques. For laboratory position responsible for theoretical experimental studies on reservoir fluid and rocks. Duties will consist of designing equipment, performing or supervising, testing and analyzing and reporting results. Studies pertinent to evaluation of primary depletion practices and applicability of secondary recovery for pressure maintenance operation will be required.

Please write giving full particulars regarding personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR
Box OG-5
Arabian-American Oil Company
505 Park Avenue
New York 22, N. Y.

WELL DRILLING TOOL EXPERT

Foreign assignment with international research and engineering organization. Thoroughly experienced in the processes of manufacturing drilling and fishing tools for use with water well drilling rigs.

Will advise and instruct local workers in improvement of manufacturing processes and maintenance methods for tools.

One year abroad. Attractive salary, overseas differential, cost-of-living allowance. Transportation furnished for family.

Box G-725, The Oil and Gas Journal
Tulsa, Oklahoma

PETROLEUM ENGINEERS

Major Oil Company in Venezuela has openings for Graduate Petroleum Engineers with 1 to 3 yrs. Production experience; to conduct Engineering Studies on Production Methods, Procedures, & Special Projects.

Also having openings for Petroleum Mechanical & Chemical Engineers for work in Production, Drilling & Gas Departments.

P. O. BOX #35
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SALES REPRESENTATIVES WANTED: Manufacturer of Test Separators, Well Testers, Metering Separators, Oil and Gas Separators, Free Water Knockouts (Crude Oil and Natural Gas), Emulsion Treaters, Water Filters, Gas Scrubbers, and related equipment wants Commission Sales Representatives for following territories: (1) Oklahoma, (2) Kansas, (3) Tri-State Area (Illinois, Indiana, and Kentucky), (4) West Texas, (5) North Texas, (6) East Texas, (7) South Texas, (8) Rocky Mountain, (9) Williston Basin, (10) California, (11) Canada, and (12) Mexico. Please give details concerning present Sales Coverage and Personnel when answering. All replies confidential. Box G-701, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

SEISMIC SUPERVISOR required by expanding and aggressive seismic contracting company. Should have ability to supervise any domestic area and have good professional contacts. Minimum requirements; college degree in geophysics or related fields and eight years' seismic experience. Good future. Tulsa location. Box G-705, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST: Wanted experienced SEISMIC SUPERVISOR for location in Rocky Mountains. Must have degree in related subject with at least 8 years' experience. In reply please give complete experience and education. Replies confidential. Box G-714, The Oil and Gas Journal, Tulsa, Oklahoma.

Micropaleontologist

Preferably with an advanced degree and a minimum of 5 years' commercial or academic experience. To work in the New York research laboratory of a major oil company. This position demands broad interests in Stratigraphy and Biofacies and the capacity to do independent work on projects assigned. Salary dependent on experience and qualifications.

Write giving personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR

BOX OGJ

Arabian - American Oil Company

505 Park Avenue

New York 22, N. Y.

WANTED FOR EMPLOYMENT: Petroleum Engineer or Geologist with two or three years' experience in Louisina Gulf Coast. Duties will entail preparation and maintenance of detailed structure and isopach maps of south Louisina fields and evaluations necessary in field studies. Work located in New Orleans with reliable and financially strong concern. Reply giving age, experience in detail and salary desired. Inquiries will be kept strictly confidential. Our employes know of this ad. Box G-713, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

GEOLOGISTS

SUBSURFACE

With degree in Geology and a minimum of 3 years' subsurface experience on deep wells. To work in Saudi Arabia on deep wells making lithologic and faunal logs from cores and cuttings, interpreting electrical logs and working on field and regional stratigraphic studies. Salary commensurate with experience and qualifications.

JUNIOR

Recent graduate with limited or no experience, for on-the-job training in Saudi Arabia.

Write giving personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR

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OVERSEAS. Contracting, Engineering and Oil firms; big pay, no U.S. taxes, cheap living costs. Send $1 for list 100 names where to apply. Foreign jobs, Box 166, Washington 4, D. C.

OIL Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974. Tom Robinson, owner. For Technical and Trained Personnel including LPG

GULF COAST GEOLOGISTS, one highly experienced, and one less experienced, for office we will open City National Bank Building in Houston. Replies will be held in strict confidence. Hunt Oil Co. Dallas, Texas.

EXECUTIVE SECRETARY for work with major oil company in Tulsa. College degree. Geological or Geophysical experience desirable. Age 25 to 30. State experience and qualifications. Box G-728, The Oil and Gas Journal, Tulsa, Oklahoma.

CORROSION ENGINEER for Venezuelan assignment with major oil company. Must have degree and related petroleum experience. Will initiate and supervise protective programs. Responsibility for all corrosion problems, both internal and external. Family housing in six months. Give full details in reply to P. O. Box 2819, Dallas, Texas.

METER AND REGULAR FOREMEN for Venezuelan assignment with major oil company. Must be thoroughly familiar with all types of well, line and customer measuring and flow control equipment. Will supervise and assist in installation, testing, repairing, calibration and maintenance of meters and regulators. Family housing in three to six months. Send details to P. O. Box 2819, Dallas, Texas.

Engineers needed for development, field and sales work in Rky. Mtns., W. Texas and Calif. with expanding serivce company. Experience not necessary. State qualifications and salary expected. Photo desired. Write

BJ SERVICES, INC.
6505 Paramount Blvd.,
Long Beach 5, California

HELP WANTED

GRADUATE CHEMICAL ENGINEERS with or without experience for positions in Research and Development department, located in Tulsa. State qualifications and salary expected. Write Personnel Department, Post Office Box 381, Tulsa 2, Oklahoma.

SITUATIONS WANTED

LATIN AMERICAN EXPERIENCE. 15 years, government ministries, geology, concessions, drilling. Graduate engineer with over-all executive experience on pioneer exploration programs for oil. Box G-710, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, B.S., 28, married, 26 months oil field experience, desires job anywhere in U. S. Write Box 1751, Hobbs, New Mexico.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 1628, Ph No 3-3141, Hobbs, New Mexico.

GEOLOGIST. Mining-Petroleum. Experienced in: surface and subsurface mapping, exploration, writing reports, surveying, drilling. Colorado Plateau experience. Box G-708, The Oil and Gas Journal, Tulsa, Oklahoma.

MATERIAL MAN: 15 years' office and field experience Oil Production Companies, Material Accounting, Pricing, physical inventories, perpetual inventory records, transfers, purchasing, partnership billing, etc. Best references. Reply Box G-715, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST experienced Kansas leasing, geology, drilling, desires connection with independent oil company or group desiring representation in Kansas. Lease and subsurface data currently maintained. Box G-709, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL ECONOMIST—BUSINESS ANALYST—BUDGET DIRECTOR. Ph.D., 38. Excellent qualifications, background. Box G-722, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM geologist and engineer having substantial managerial experience in production and exploration desires position offering opportunity and enterprise. Box G-721, The Oil and Gas Journal, P.O. Box 1260, Tulsa, Oklahoma.

MATERIAL MAN—Desires position in Material or Purchasing. 39, BBA Degree, Ten years Supply Store Manager, Drilling & Production experience. Best references. Box G-723, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM GEOLOGIST: 2½ years interpretive and computing experience in geophysics with major company. 1951 graduate. Richard Farrar, 3636 Urban, Dallas, Texas. Phone EVergreen 2390.

DRLG. SUPT: Nine years' experience, all phases drilling and well completion, Gulf Coast, offshore, Mid-Cont., Okla., Kans., Colo., Neb. & Wyo. Plus one year in South America. Dual and triple zone well completion and reservoir engineering. Have been in oil work since 1934. Graduate Petroleum Engineer. Box G-731, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES DEVELOPMENT ENGINEER: Fifteen years' experience. Acquainted with executives and engineers in producing department of oil companies in Tulsa, Houston, Dallas and New York. Can produce results. Box G-729, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED—FEMALE

FEMALE Secretary-Assistant, 30; ten years' extensive lease Geological experience various localities. Desire position New York City. Box G-730, The Oil and Gas Journal, Tulsa, Oklahoma.

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WANTED: Lease to drill, not over 4,000 ft., in Oklahoma or Tri-State Area. Box G-726, The Oil and Gas Journal, Tulsa, Oklahoma.

WILLISTON BASIN—MINERAL RIGHTS For lease, mineral rights on half-section twenty miles from Forget, Saskatchewan, Canada. Box G-727, The Oil and Gas Journal, Tulsa, Oklahoma.

SHALLOW OIL FIELD, 1000-acre lease, three wells just completed, laboratory reports. Will **TURN IT OVER** for enlargement or sell for $45,000.00. Excellent water flow. Mr. C. Shepard, 1314 South Grant, Chanute, Kansas.

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Tulsa, Oklahoma

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EQUIPMENT MEN . . . in the News

Canadian Office Opened By American Mfg. Co. of Tex.

American Manufacturing Co. of Texas has announced the opening of a new branch office in Calgary, Alta., Canada. H. A. (Hoot) Priester has been appointed sales representative for Canada and will be in charge of this office.

Priester joined the company as a mechanic in 1942, and also served as truck driver for several years. For the last 2½ years he has been a service man. In recognition of his knowledge of the field, the company's products, and preparation and qualification for advancement, Priester was promoted to sales representative for Canada. All sales and service for American products in Canada will be handled through Priester's office in Calgary.

Home offices of the company are in Fort Worth, with other branches in New York, Tulsa, and in Houston, Odessa, and Kilgore, Tex.

Hughes Garneau Completes New Manufacturing Plant

A new manufacturing plant and office building that will produce cement-lined pipe for all industries and particularly the oil and gas business has been completed in Seminole, Okla., by Hughes Garneau Co., of Tulsa, according to L. Hughes Garneau, president.

Established in Tulsa 14 years ago, the Garneau company founded its first plant in Bartlesville, Okla. Other Garneau factories that manufacture cement-lined pipe are located in Gladewater, Tex.; Iola, Kans.; Ellinwood, Kans, and Salem, Ill.

Cardinal Chemical Names Additions to Research Staff

Cardinal Chemical, Inc., Odessa, Tex., has announced three additions to its research staff. They are: J. D. Crawford, research chemist; Roscoe Jarmon, assistant chemist, and Jim Scott, office manager.

Crawford joined Cardinal August 20. He is a graduate of Hardin-Simmons University with B.A. and M.A. degrees. Jarmon was formerly head of the treating department at Consumers Co-Operative Refinery Association in Levelland, Tex., and was employed by that firm from 1941 to 1953. Scott, graduate of Fayetteville Business College, Fayettville, Ark., was formerly office manager for Snyder Co. in Odessa.

Beech Aircraft Announces Executive Appointments

C. C. Pearson, Beech Aircraft's vice president in charge of manufacturing, has been elected to the corporation's board of directors, and two Beechcraft

department heads have been elected as vice presidents, as announced by President O. A. Beech following a recent meeting of the board.

Named vice president in charge of contract administration is James N. Lew, Wichita, and vice president in charge of military sales is Lynn D. Richardson, Washington, D. C., with 6 years' service with Beech Aircraft.

Other board members are: Mrs. O. A. Beech, president; John P. Gaty, vice president and general manager; Frank E. Hedrick, vice president, and coordinator, and Dwight S. Wallace, counsel.

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Statement of the Ownership, Management, Etc., of

THE OIL AND GAS JOURNAL

October 12, 1953

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The average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was 28,807.

S. H. ROURKE,
Business Manager.

Sworn to and subscribed before me this 22nd day of September, 1953.

ROBERT D. FUNK,
Notary Public.

My commission expires April 19, 1955.

LEGAL

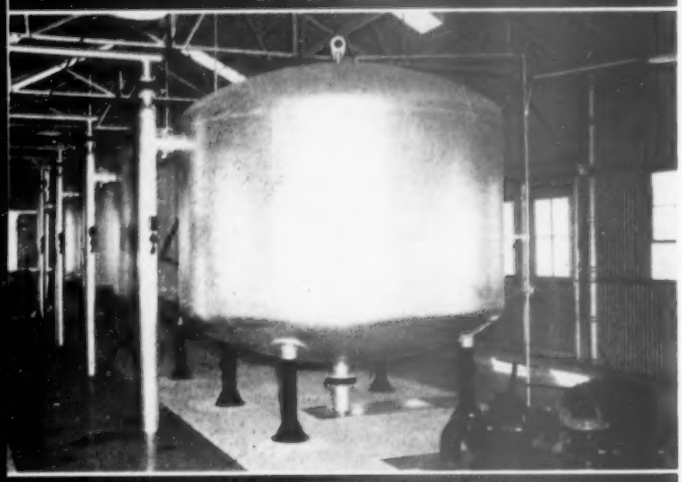
U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that approximately 40 acres of acquired land comprising the W½SE¼SW¼ and E½SW¼SE¼ sec. 18, T. 11 N., R. 15 W., Mich. M., within the known geologic structure of the Cedar Creek field, undefined, Muskegon County, Michigan, will be offered in one parcel for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1 p.m. E.S.T., October 28, 1953, when bids will be opened. Details of the lease offering and how and where to submit bids may be obtained upon request from this office. L. E. Hoffman, Chief, Division of Minerals.

LEGAL

28,263.27 acres of Tribal Indian lands and 4,484.63 acres of Allotted Indian lands located on the Uintah and Ouray Indian Reservation, Townships 1 and 2 North, Ranges 1 East and 1 West, Uintah Special Base and Meridian Survey, Uintah and Duchesne Counties, State of Utah, are being advertised for oil and gas lease sale, bids on which will be opened 2:00 P. M., October 14, 1953, at the Uintah and Ouray Agency, Harry W. Gilmore, Superintendent, Fort Duchesne, Utah. Full particulars may be obtained from the office of the Regional Oil and Gas Supervisor, U. S. Geological Survey, Casper, Wyoming, or from the Uintah and Ouray Agency.

NATIONAL RAPID MECHANICAL WATER FILTERS

Four 8′ x 5′ National Rapid Mechanical Water Filters in West Texas.



Four 10′ x 5′ National Rapid Mechanical Water Filters on an Oklahoma water flood project.

National Rapid Mechanical Water Filters are used for filtering water in salt water disposal and water flood projects and municipality installations. Filters are rated according to best empirical values. Common backwash rates are 12 to 20 gallons per minute, per sq. ft. of filter area.

Size	Nominal Water Cap. Bbls./Day	Approximate Weight of 40 lb. W.P.
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6′ x 5′	2300	2100 lb.
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8′ x 5′	4200	3200 lb.
10′ x 5′	6600	5540 lb.

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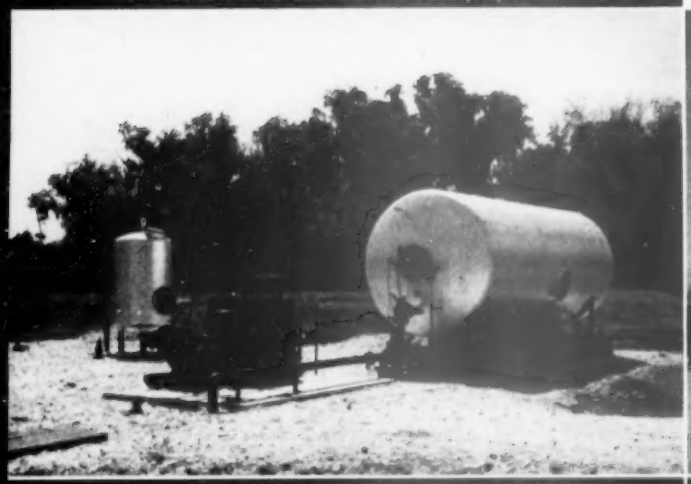
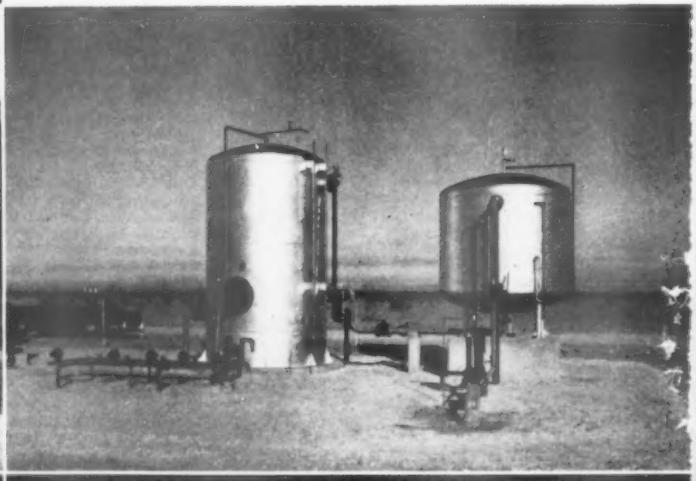


A National 4′ x 5′ Rapid Mechanical Water Filter in a water disposal plant in Texas.



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